March 29, 1943

STEEL

The Magazine of Metalworking and Metalproducing

ESTABLISHED 1882

TECHNOLOGY DEPT.

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DETROIT

Working for Victory

GRANITE CITY STEEL COMPANY

GRANITE CITY — SINCE 1878 GRANITE CITY STEEL — ILLINOIS

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THIS MIGHT GET YOU OUT OF A JAM

In truing Radii and Angles

BUT FOR A GOOD JOB

YOU'LL WANT THE HEALD UNIVERSAL DIAMOND

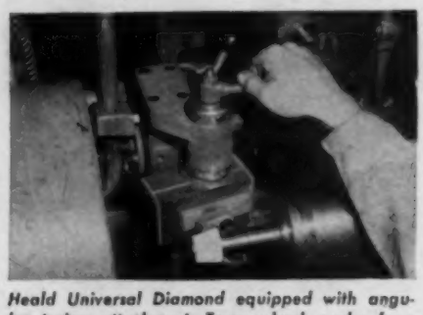
If the work ground on your Heald No. 72A Plain Internal is all straight-hole grinding the standard truing diamond is exactly what's required to do a good job of wheel truing. But if you have work that involves grinding of radii and tapers as well as straight surfaces, the standard diamond of course will take care of straight truing but not radii or tapers.

For truing wheels to special shapes two different methods can be employed. One method requires no more equipment than an abrasive stick, but should be considered only as a temporary expedient. Using this method the operator holds the stick in his hand and manually trues a radius or chamfer on the corner of the wheel, using a template for checking contour. Even with an experienced operator this is a cut and try procedure and consequently is inaccurate and slow.

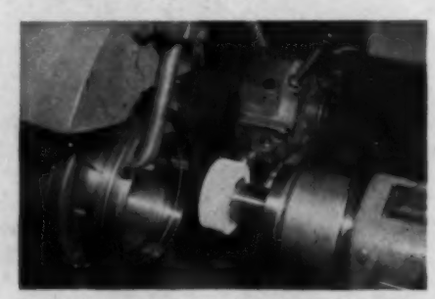
The recommended process, if you want speed and accuracy in truing special shapes, is to replace the standard diamond unit with the Heald Universal Diamond. This truing device consists of a basic unit which can be furnished with three quickly interchangeable diamond attachments each specifically designed for the separate operations of radius truing, angular truing, and straight truing as illustrated.

Here's a really useful attachment which will give your Heald No. 72A Plain Internal extra flexibility for grinding a greater variety of work. Can be furnished as original machine equipment or supplied for attaching in the field.

The Heald Universal Diamond arranged with radius truing attachment. Trues wheel radii from 0 — 2½".



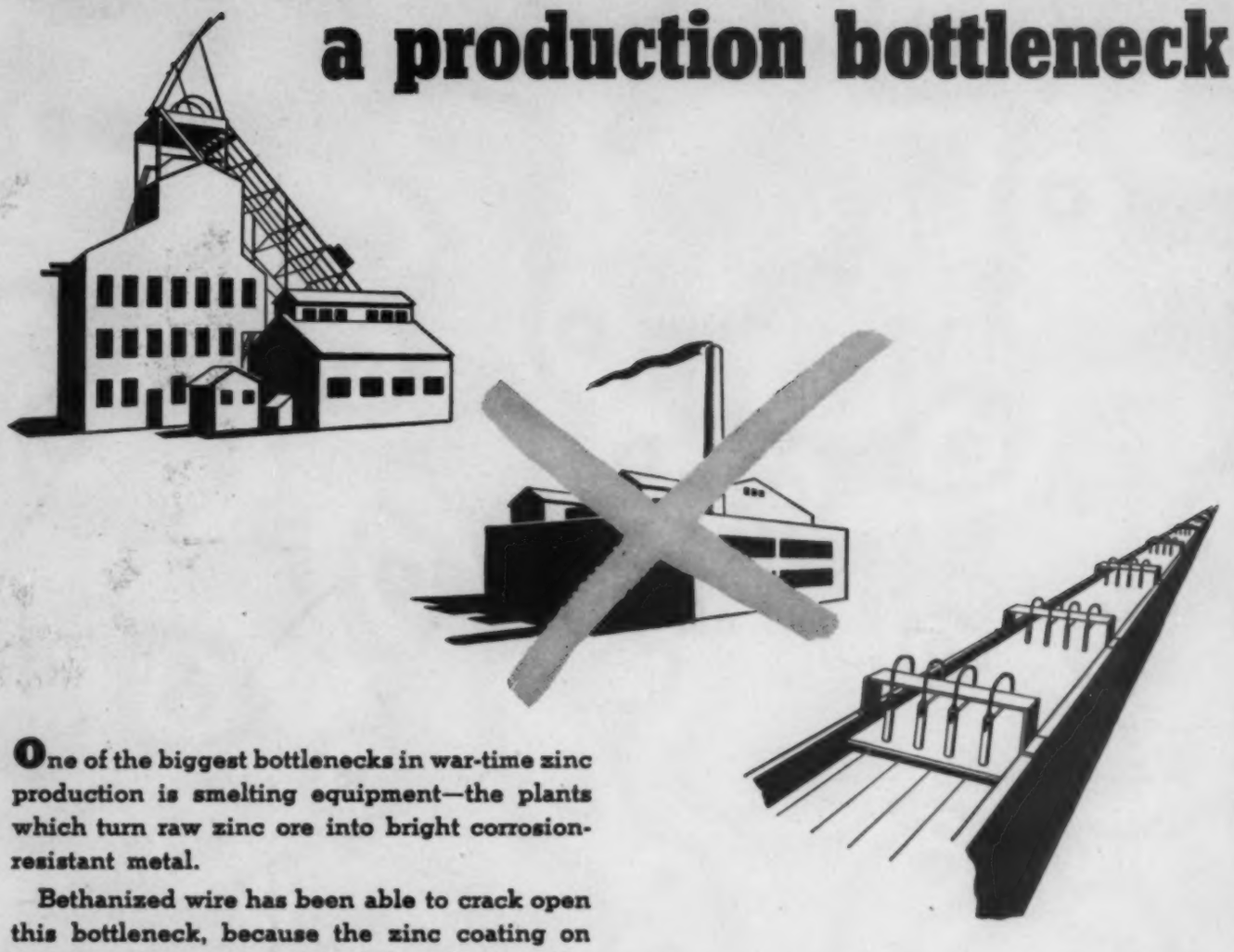
Heald Universal Diamond equipped with angular truing attachment. Trues wheel angles from 0 — 90°, has 1¼" stroke.



Heald Universal Diamond with straight truing attachment.

THE HEALD MACHINE CO. WORCESTER MASS. U. S. A.

Bethanized Wire cracks a production bottleneck



One of the biggest bottlenecks in war-time zinc production is smelting equipment—the plants which turn raw zinc ore into bright corrosion-resistant metal.

Bethanized wire has been able to crack open this bottleneck, because the zinc coating on bethanized wire is produced directly from the zinc ore. No smelting is necessary.

The electrolytic bethanizing process draws 99.9+ per cent pure zinc out of solution and deposits that zinc on the wire to form a coating that is uniform both *along* and *around* the wire; a coating that is so tight it won't flake or peel off even when the wire is drawn through dies. In addition to these advantages, a bethanized coating offers unusually good resistance to atmospheric corrosion, as this coating can be applied in double or triple weights.

Bethanized wire is doing many kinds of war jobs—from armoring submarine cables to providing a much-needed alternative material for brass in zippers on pilot's suits and parachute packs.

Under the stress of emergency, many new jobs have been discovered for bethanized wire, necessitating revision of all previous ideas as to its possibilities, and pointing to a far broader field of usefulness in the post-war years.

BETHLEHEM STEEL

UNITED'S

New PLATE SHEAR

Fully Equipped to Shear Plates 3/16" to 2" thick.

Cross Cutting or Slitting as desired.

in 8 sizes

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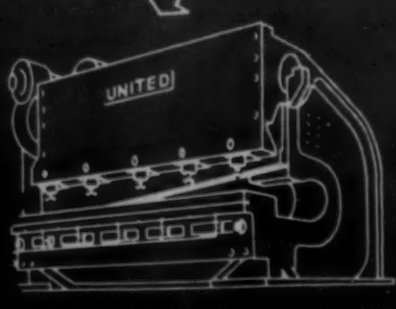

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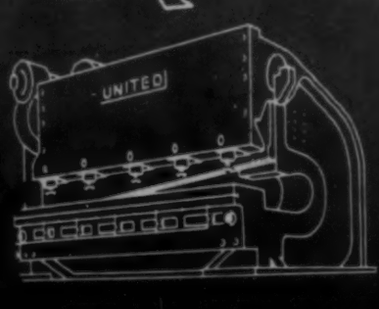


#700

UNITED ENGINEERING and FOUNDRY COMPANY

00 #600 #500 #400 #300

PITTSBURGH · PENNSYLVANIA

BEHIND THE SCENES

Fan Mail

■ As noted in the March 15 issue, Welling F. Thatcher, formerly president of United States Steel Corp.'s subsidiary in Brazil, has joined Cross Gear & Machine Co., Detroit, as management executive. In acknowledging this mention in STEEL, Mr. Thatcher adds this interesting sidelight:

When I lived in Brazil, American employes were always on the lookout for the next issue of STEEL, and they probably read your magazine more intensely than any other published in the United States.

NE Steel Handbook

■ An unusual amount of interest is brewing in connection with STEEL's forthcoming NE STEEL HANDBOOK and NE STEEL SELECTOR, now in preparation and expected no later than April 15. The combined handbook and slide-chart selector will sell for $1.50 and several hundred advance orders are already in. Several companies are ordering quantities for distribution to their customers and if you contemplate being able to use very many your advance reservation will be appreciated so that the original press run will be ample. Address Readers Service Department, Penton Building, Cleveland.

Annual Report

■ We may be a little late but in case you have been struggling with your company's annual report to your stockholders and seem to be getting nowhere fast in trying to explain just what all went on in 1942, you might gather some worthwhile ideas from the following which we stole from the *Stove Builder* and toyed with a bit:

Your officers are glad to report business over the past year has been vastly improved. In fact, we almost broke even.

Your company was able to get a little work done around the plant in 1942 by naming six vice-presidents in charge of visits from tax agents, thus saving the higher executives the major amount of their time. We built a new wing on the factory in which all data, facts, figures, reports, explanations and apologies demanded by the government may be prepared and turned out. The plant is capable of answering 50,000 inquiries from Washington per week, and is naturally running at full capacity. Plans are now being drawn for an annex to the new wing in which all summons to congressional probes can be received, filed and catalogued without confusion.

The company has also appointed a vice-president in charge of nervousness, a vice-president in charge of apprehension, and two vice-presidents in charge of grave misgivings. The latter two are also helping run the elevators and sort the mail on busy mornings.

Our cash position is strong, due to a new system of loose leaf, loose thinking and loose figuring bookkeeping, now quite the rage. We think this means a lot of good clean fun until either we change auditors or the revenuers drop in for a visit some day.

And so to summarize, it is safe to say the general outlook is good and we know you will be glad to hear that after suspending the custom over the lean years, we have decided to renew distribution of art calendars to all stockholders of record.

My Prayer

■ In this Lenten season which is so full of world-wide tragedy but is still encouraging as the basis of the peaceful world to come, we offer this prayer as written by H. Freeman Barnes, Sales Promotion Manager of the General Electric Co. at Nela Park.

I pray . . . that for my part in this total war, I may waste neither my time nor my talents.

I pray . . . that whatsoever I can do, I shall do—and that I will do my part to the utmost of my ability. . . . That I shall work harder and longer than ever before.

I pray . . . that I will not over-emphasize the importance of making a daily living, against the importance of making a sincere daily contribution to victory.

I pray . . . that I can realize, if needs be, how little of real value I may be accomplishing, instead of contemplating the little I do with applause-seeking satisfaction.

I pray . . . that I may never attempt to capitalize on conditions brought about by the war, when, as an American, I know the only thing that profits is helping end this war sooner.

Yet—I also pray for the strength and wisdom to help plan the program for the peace.

I pray . . . that I may not care for either credit or criticism of my conduct, when, in my heart, I know I have done my best.

And, I pray . . . that I will be so guided that, in some small way, my earnest efforts will also help in preserving the ideals for which we fight.

This is my prayer . . . and my creed . . . and my pledge.

"Tale of a City"

■ If you want to read the most gripping and gruesome story of Nazi tyranny we have yet seen, write the Division of Public Inquiries, Office of War Information, Washington, and ask for a copy of "Tale of a City". It is the story of Warsaw, Poland, and was illustrated by a former officer of the Polish Army who was an eyewitness of the early days of the occupation.

Second "Looeys"

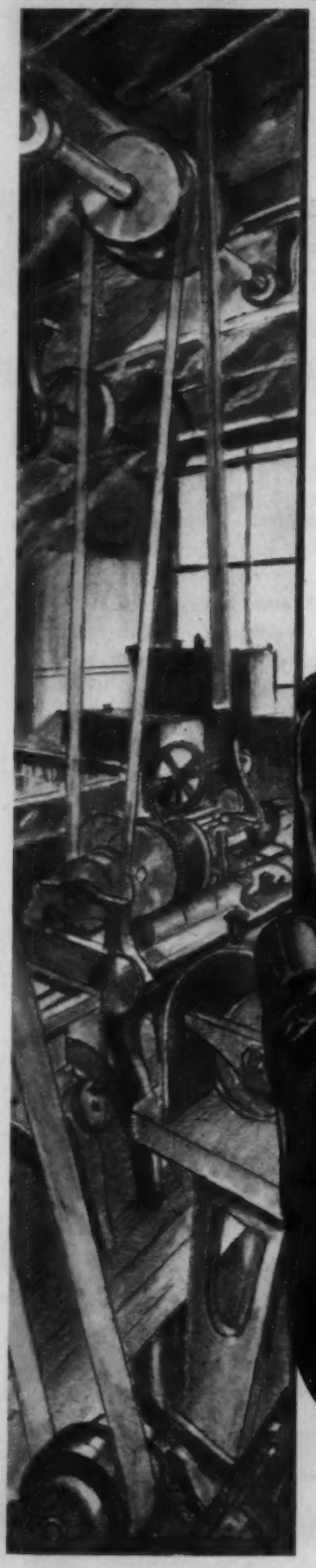
■ We now have authoritative information on a question that has been bothering us for a long time, namely, why new second lieutenants are called "shavetails." You may have known it all the time, but in case you didn't, it's because of an old Army regulation which barred the shaving of mule's tails. Veteran Army mules consequently had long, hairy tails, while newly inducted mules usually had shaven tails with tassels on the end, as is the civilian custom. Need we go on?

Vol. 112, No. 13, March 29, 1943, issue of STEEL, published every Monday at Cleveland, Ohio. Entered as second class matter at the post office, Cleveland, O., under act of March 3, 1879. U. S. and possessions, Canada, Mexico, Cuba, Central and South America, 1 year $6; 2 years $10; all other countries, 1 year $12. Current issues, 25c. Yearbook of Industry issue, $2.00.

Editorial Contents—Page 27

PUSHING ASIDE OLD METHODS WITH INDUSTRY'S NEW RIGHT HAND

Shell Loading—A Ticklish Job Done Better And Faster!



Packing explosives in high-caliber shells is such an exacting job that, until recently, only slow, cumbersome, hand-controlled equipment was thought to be safe and accurate enough for the operation.

Then HydrOILics took over!

Today, HydrOILic Presses like the one shown here are packing big shells with maximum precision . . .

turning them out at a hitherto unheard-of speed . . . and with safety for the operator.

Shell-loading is just one of hundreds of jobs . . . in almost every industry . . . that are being speeded up, made safer, more accurate and more economical . . . by means of HydrOILic equipment or controls. *Applying* the smooth, flexible accuracy of oil hydraulic operation to Industry's production equipment is the specialized skill of Denison Engineers. That's why HydrOILics has become Industry's New Right Hand! Chances are, HydrOILics can give you a better answer to several production problems. Of course, we have a day-and-night war job to do, but our engineers can give you some sound ammunition for tomorrow's problems. Write today, or call your Denison representative.

The DENISON ENGINEERING CO.
1163 DUBLIN ROAD COLUMBUS, OHIO

INDUSTRY'S NEW RIGHT HAND FOR POWER, SPEED and CONTROL

DENISON EQUIPMENT in APPLIED Hydr ics

More power to the steel industry, to their metallurgists and production men, for the new steels and their new capabilities.

They are talking our language.

Industry's postwar responsibility for making civilian jobs will have to be met head-on with all the capabilities of all the materials at our command.

No matter how much we might wish it, Alcoa Aluminum can never be best for everything. There are lots of things the new steels do better than Alcoa Aluminum can. And, with much emphasis we say: *Vice versa*. We also see spots where aluminum *and* steel together are the answer.

The real hope of making jobs, i.e., of America having a successful business structure after this thing is over, lies in doing things differently. Tradition must be shouted down, and we welcome the new steels to the party.

Every man who has the foresight to use his eighth day of thinking time for Imagineering has thrilling tools to work with.

One thing about Alcoa Aluminum: *Nature made it light*. Alcoa research has made it strong, and versatile, and cheap.

One thing about the future: There isn't going to be time or money or patience to waste on horsing dead weight around, or up or down, or on the level.

ALUMINUM COMPANY OF AMERICA, 2112 Gulf Building, Pittsburgh, Pennsylvania.

Alcoa Aluminum

WHERE PLATE IS WELDED

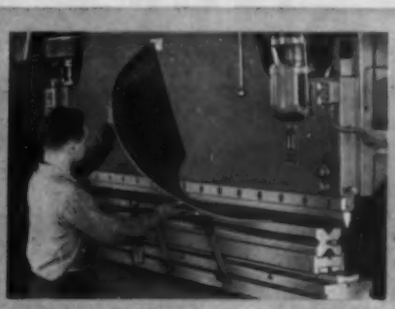
A STEELWELD IS NEEDED . . .

Whether you make army tanks, boilers, railroad cars, ships, machinery or airplanes, if you work with metal from 12 gauge to one inch thick, most likely you have great need for a Steelweld Bending Press.

Steelwelds are versatile tools that perform many types of work quickly and easily, whether only one piece or a production run is required. Long, sharp welded corners can be replaced by quickly made, smooth, round, bended ones, and both appearance and strength improved. Illustrated below are some of the many kinds of work that can be performed on any Steelweld.

It will pay you to investigate the many possibilities of this modern metal-forming tool that is improving product appearance and saving time and money for many enthusiastic users.

Corrugating and any straight-line production bending can be done to hairline accuracy.



Conical sections are quickly formed with standard bending dies by use of the ram-tapering mechanism.

Large diameter holes can be punched singly. Bolt holes and other holes can be punched 25 to 150 at a time.

GET THIS BOOK!

CATALOG No. 2002 gives complete construction and engineering details. Profusely illustrated

THE CLEVELAND CRANE & ENGINEERING CO.

1125 EAST 283RD ST. WICKLIFFE, OHIO.

CLEVELAND

STEELWELD PRESSES

GENERAL SALES AGENTS: THE CYRIL BATH CO. E. 70TH & MACHINERY AVE., CLEVELAND

And Ever Since —
Countless Numbers of
Independent Mobile Oxygen Generators
Are Supplying Oxygen for Our Fighting Forces

Now on the World Battle Fronts

Pioneering developments carried on by *Independent* Engineers . . . exhaustive first-hand study in foreign lands—long before war clouds gathered . . . made it possible for this organization to design and produce these engines for war . . . now serving wherever oxygen is needed to "keep 'em flying" . . . solving a vital problem in logistics.

This is but *one* of *Independent's* many "FIRSTS" to help the war cause—watch for the news of others.

Uncle Sam NEEDS Experienced Men to Operate These Machines

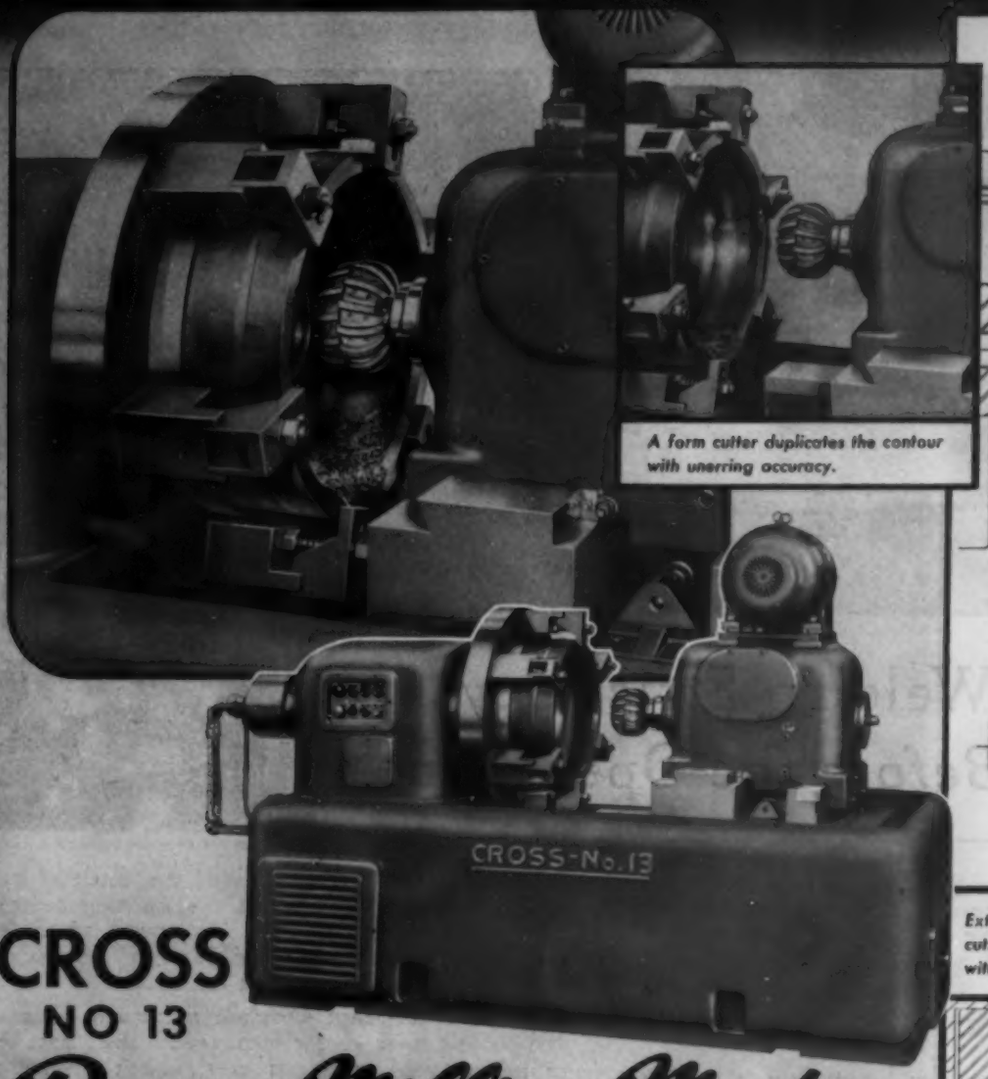
If you know of anyone now in the service, or scheduled to be, who has had oxygen or hydrogen producing plant experience, suggest that they investigate the opportunities in serving their country in this field. Those in service consult with their superiors—those entering service should consult with their local recruiting office.

If further details are wanted, we will be glad to supply them — address

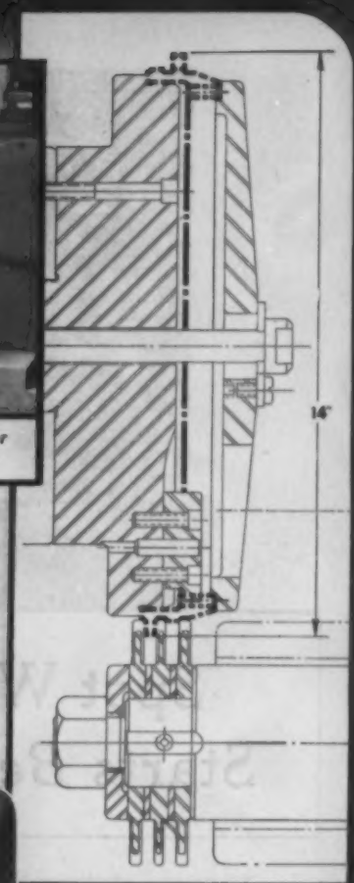
Independent Engineering Co.

IECO

105 WEST SECOND STREET—O'FALLON, ILLINOIS



A form cutter duplicates the contour with unerring accuracy.

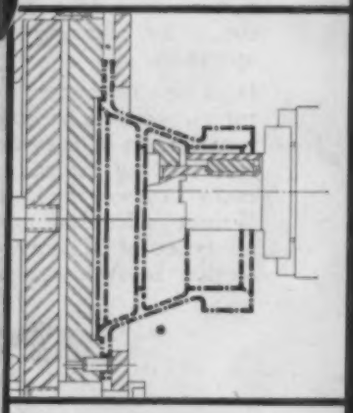


External operations with interrupted cuts are finished to close tolerances with the Cross Rotary Miller.

CROSS NO 13 *Rotary Milling Machine*

TOP ACCURACY—A GOOD FINISH—1/12 THE TIME is the story of machining Fluid Drive Housings with the Cross Rotary Miller. Automatic operating cycle with centralized push button control enables unskilled labor to achieve maximum results without scrap. Three models for small, medium and large work.

First and Foremost with Rotary Milling.

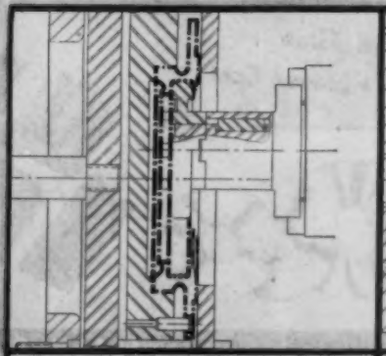


Irregular contours are processed in the usual way without special attachments or tooling.

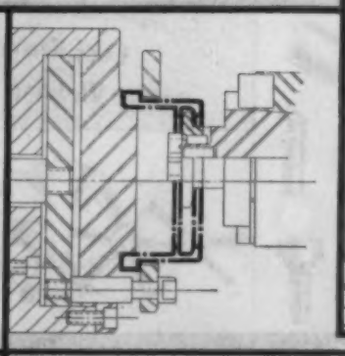
CROSS GEAR & MACHINE CO.

Established in 1898

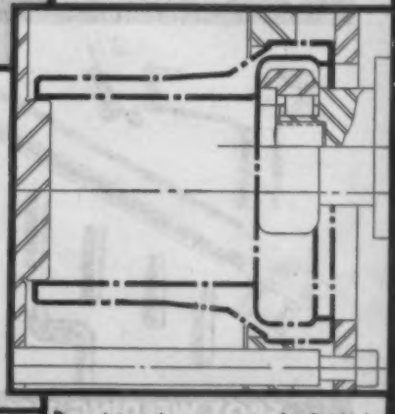
DETROIT, MICHIGAN, U.S.A.



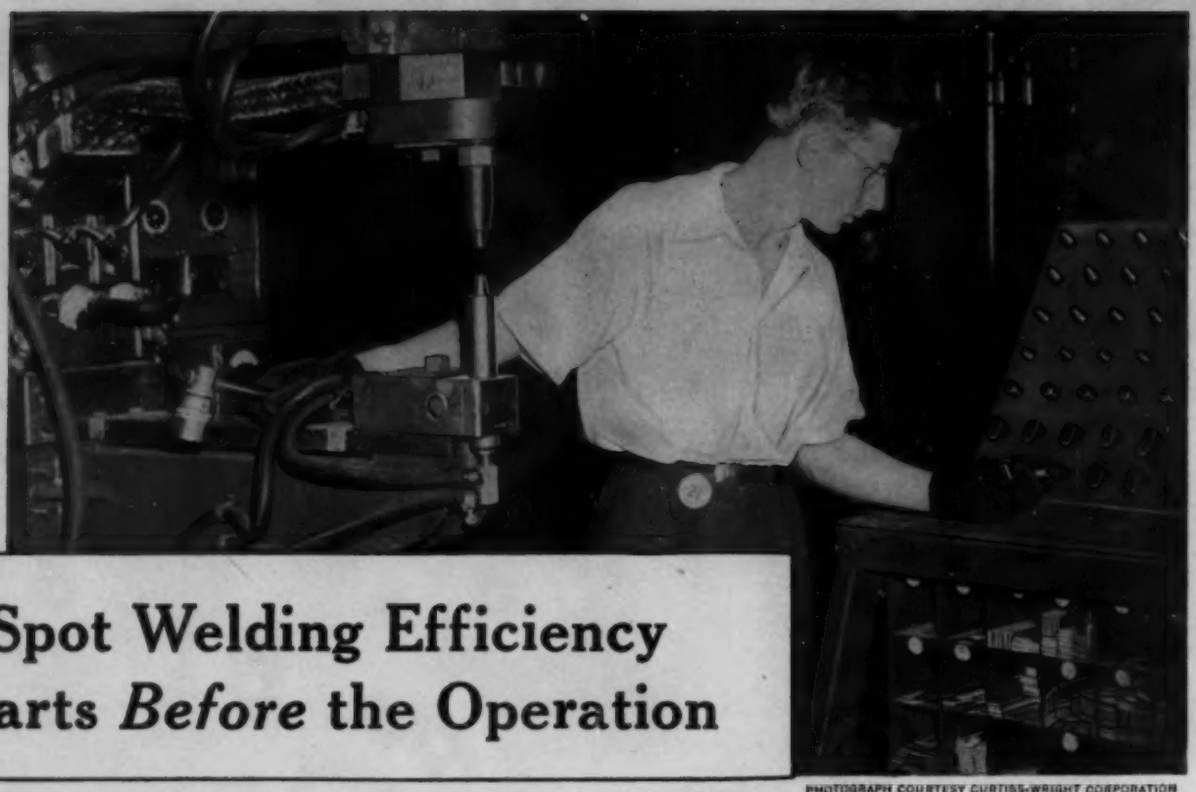
Rotary milling is an ideal method for handling many difficult operations on aircraft parts.



Multiple edge cutting tools with an enveloping cutting action satisfy the most exacting demands for fine finish.



Deep internal contours can be finished in one operation with the Cross Machine.



Spot Welding Efficiency Starts *Before* the Operation

PHOTOGRAPH COURTESY CURTISS-WRIGHT CORPORATION

Successful spot welding depends on accurate control of electrode pressure, current, position of parts, cooling and dressing of electrodes.

Welders save man hours—conserve essential raw materials . . . do a better resistance welding job, too . . . by planning *ahead* of the actual machine operation.

It is small wonder then, that aircraft manufacturers, working at top speed to get planes to the four corners of the earth, pioneer in welding progress. Among the many aids to efficiency are the racks (shown in photograph) in use at Curtiss-Wright affording complete visual selection of all types of Mallory electrodes. The pigeon-hole section below contains correctly-welded samples, as well as unwelded samples of the material by which the operator can test the machine before starting production welding. By means of these samples, all adjustments of Mallory electrodes and of the amount of current are made.

Selection of the best electrode materials, designs and cooling methods for spot, seam, flash, butt or projection welding is not easy . . . but the right answers in any specific application will speed output tremendously. Mallory metallurgists are at your service to give those answers. They can help you produce better welds faster, and at lower cost.

Write today for specific data; if you'd like a free copy of the Mallory Resistance Welding Data Book, mention it in your letter.

P. R. MALLORY & CO. Inc.

MALLORY

P. R. MALLORY & CO., Inc.
INDIANAPOLIS INDIANA
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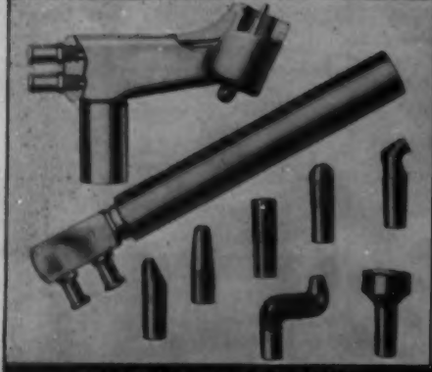
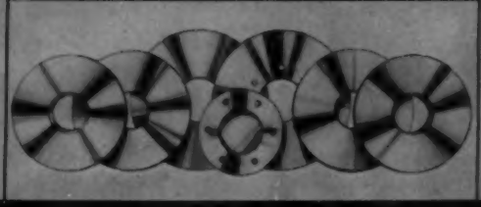
Standardized Resistance Welding Electrodes



SPOT WELDING TIPS AND HOLDERS

Speedier Production
Less Down Time
Better Welding • Lower Cost

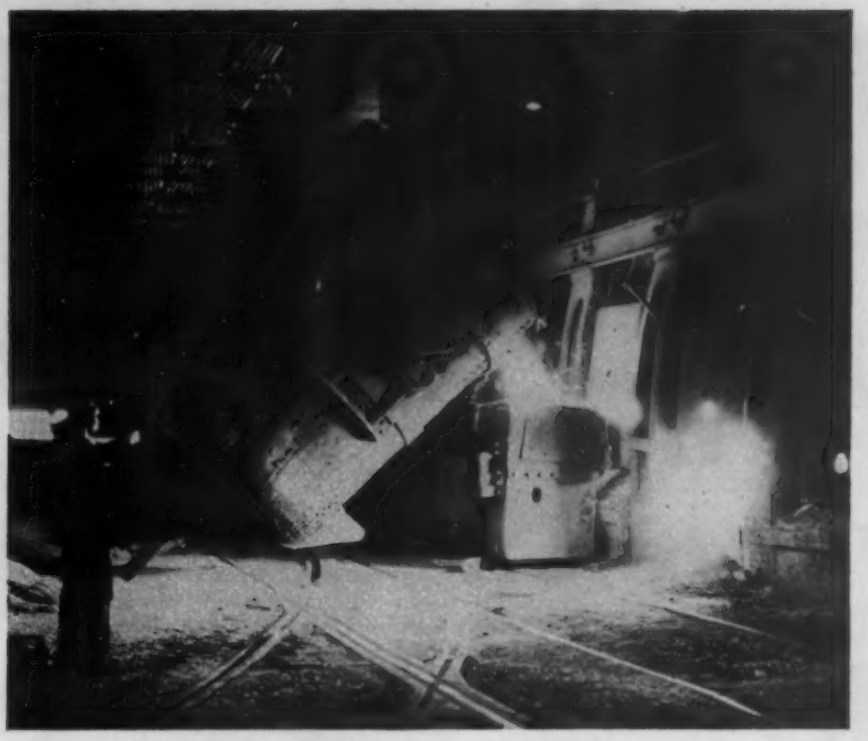


SEAM WELDING ROLLS

FLASH, BUTT, PROJECTION WELDING DIES

Weirton's "DOUBLE CONTROL" of quality

means *better steel* for the Armed Forces



Weirton's "double control" of quality starts at the very first step in the steel-making process—that is, with the iron ore. From that point on, the combination of control by men and machines maintains quality. Each step is under the critical eyes of skilled and experienced men—men who have devoted their lives to the art and science of better steel-making.

Coupled with these masters of their craft are the most modern—the most advanced—machines and equipment that have been developed by and for the steel industry.

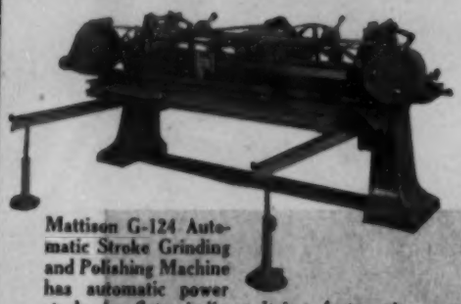
So, at every step, skilled men and the best machinery are combined to provide "double control" to all Weirton steel. Every man and woman at Weirton is working to see that our Armed Forces get the steel they need to speed Victory at the earliest possible moment.

WEIRTON STEEL COMPANY
Weirton, West Virginia

Sales Offices in Principal Cities

Division of
NATIONAL STEEL CORPORATION
Executive Offices · Pittsburgh, Pa.

MATTISON ABRASIVE BELT GRINDING AND POLISHING MACHINES . . .



Mattison G-124 Automatic Stroke Grinding and Polishing Machine has automatic power stroke for flat grinding. It is a fast cutting machine, due to roll pressure having a point contact.

★ Results obtained in a number of plants definitely establish the use of factory-coated abrasive belts as a most efficient practice. Besides reducing the number of rejections and improving the finish, they have cut the polishing cost per piece through increased production.

However, to secure full benefit from factory-coated abrasive belts, the right type of mechanical unit is necessaey. The machine is all important for properly applying the abrasive to the particular job to be done.

Mattison Abrasive Belt Grinding and Polishing Machines are engineered with a knowledge of the factors involved to give the best application of belts. From the time factory-coated abrasive belts were introduced for metal grinding and polishing, Mattison's have developed and built machines to provide best results.

Mattison Abrasive Belt Grinding and Polishing Machines are used for smoothing up welding marks, polishing solid parts—such as handwheels, levers, handles, steel sheets including stainless steel—and the inside of tubes. They are built for both the wet and dry grinding method. In addition to the finishing of metal parts, they are used for plastics, hardened rubber, fibre, glass, etc. In fact, the applications are so numerous, only a few can be mentioned and shown on this page.

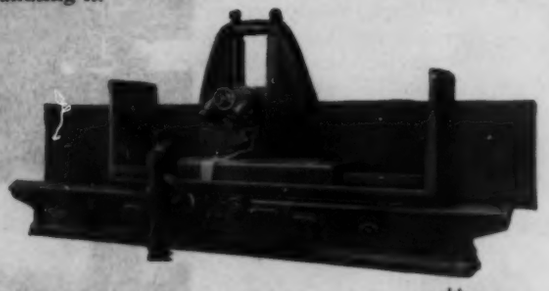
Whatever your problems may be, it is well worth while to make an investigation as to the machine available for handling it.

Mattison G-472 Spotting Machine is used for spot grinding steel sheets.

MATTISON GRINDING MACHINERY

Mattison L-137 Hand Block Grinding and Polishing Machine for flat, as well as contour work. With shaped hand blocks, this machine will perfectly grind and polish edges of practically any contour.

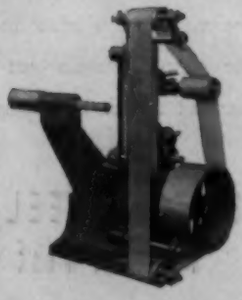
The Mattison High-Powered Precision Surface Grinder is well known throughout industry for its precision work and ability to speed production. →



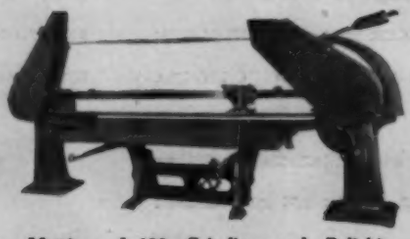
Mattison S-441 Grinding and Polishing Machine for flat and curved work. Can be furnished with or without special fixtures, depending on work ground. ←

Mattison W-455 Wide Belt Grinding and Polishing Machine for finishing of wide, stainless steel sheets.

Mattison H-424 Internal Tube Grinding and Polishing Machine for finishing inside of metal tubes.



Mattison J-115 Variety Belt Grinding and Polishing Machine for flat and curved surfaces. →



Mattison L-138 Grinding and Polishing Machine arranged for wet grinding.

Mattison J-135 Idler Stand and Pulley adapts regular polishing jack to the use of factory-coated abrasive belts. →

MATTISON MACHINE WORKS

ROCKFORD · ILLINOIS

Plymouth 65-ton Diesel Flexmotive *(mechanical drive)* in operation in one of the country's outstanding steel mills.

THAT's only part of the picture. With a Plymouth Flexomotive pushing the loads through, steel mills keep *days* ahead, *dollars* ahead.

Day in and day out, under all kinds of conditions, Flexomotives deliver the kind of track haulage performance that pays off in production. Throughout the country . . . right now . . . they are setting new standards for moving more tonnage, faster, and at lower cost.

If that's what you're looking for, write for facts and figures. In our forty years of building locomotives we've compiled records on installations similar to yours . . . and can tell you which of our models, from 2½ to 70 tons, gasoline or diesel, best fills the bill. We'll be glad to do so . . . at no obligation.

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DIVISION OF THE FATE-ROOT-HEATH COMPANY, PLYMOUTH, OHIO

*REG. U. S. PAT. OFF.

PLYMOUTH Flexomotive

DOLLAR FOR DOLLAR———THE GREATEST LOCOMOTIVE EVER BUILT

HARD HITTING TANKS

depend on . . .

COLD FINISHED STEELS

When a battle decision may turn on tank performance, it is vitally important to use the finest obtainable high-strength materials in every detail of construction.

Cold Finished Steels give the necessary super-strength and stamina without waste of metal. Their resistance to wear, impact and heavy stresses under long-continued action helps to build up the power of a tank to "take it" and to "dish it out."

B&L Bar Steels and Shafting are showing unusual records of service in all the various types of combat equipment. And in addition they simplify manufacturing operations. The uniformity and free-cutting qualities of B&L Cold Finished Bars insure speed and accuracy in fabrication and assembly of machine parts.

Available in carbon steels and alloys, both standard and "N.E." grades . . . cold drawn, as well as furnace treated.

COLD DRAWN BARS • GROUND SHAFTING • SCREW STOCK • ANNEALED BARS • ALLOY STEELS

BLISS & LAUGHLIN, INC.

HARVEY, ILL. Sales Offices in all Principal Cities BUFFALO, N.Y.

Salem Circular Soaking Pits

BIGGER PRODUCTION · HIGHER YIELD · BETTER STEEL

SALEM SOAKING PITS are in reality circular shaped Ingot Heating Furnaces. They heat cold or hot carbon steel or alloy ingots 25% faster, while at the same time they prepare ingots better for first-class rolling at lower cost. Production data also reveals a 25% increase in tonnage. More accurate control of ingot temperatures than with other types permits a 1% reduction in scale formation PLUS a 1% increase in yield. . . . .

Being of circular shape and having NO FORGOTTEN CORNERS AND NO COLD POCKETS, Salem Pits not only heat more ingots per square foot of occupied floor space than do the square or rectangular pits, but they also heat them MORE UNIFORMLY. Heat is obtained from a multiplicity of oil or gas burners and the hot gases enter the pit at a tangent to the circular wall of the furnace which causes the gases to follow a circular path. Thus, the hot gases are in contact with the ingots for a longer period with relatively low burner velocity. Furthermore, there is no flame impingement on the furnace wall or the steel, and all ingots are heated uniformly from top to bottom. Salem Circular Pits are built in all sizes to meet any production or building requirement. Remember, too, that the world's largest pit is of Salem design. Write today for more comprehensive facts.

SALEM ENGINEERING COMPANY

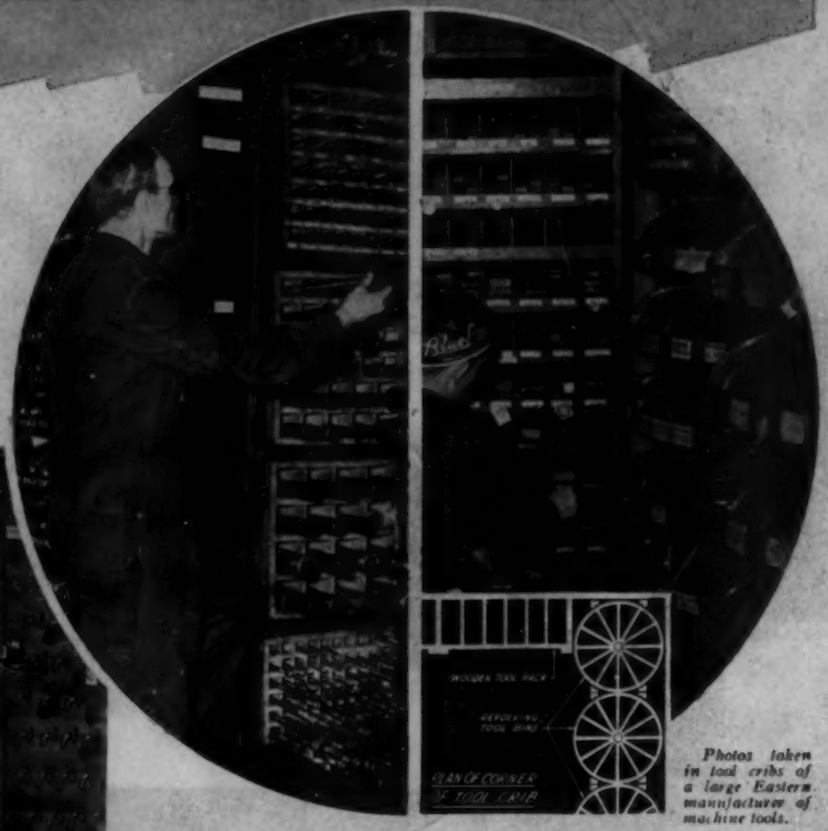
SALEM ENGINEERING CO. · SALEM, OHIO

Tool Conservation BEGINS IN THE TOOL CRIB

Broaches (in circle, left) that formerly took much more space when spread lengthwise on flat shelves, now fit easily into these bins. Clear visibility and convenience to the delivery window mean less waiting time for these tools

•

Revolving bins (in circle, right) make the most of every square foot of space, give ready access to their contents. Sketch indicates how former "dead corner" was saved, and space made for wooden tool racks.



Photos taken in tool cribs of a large Eastern manufacturer of machine tools.

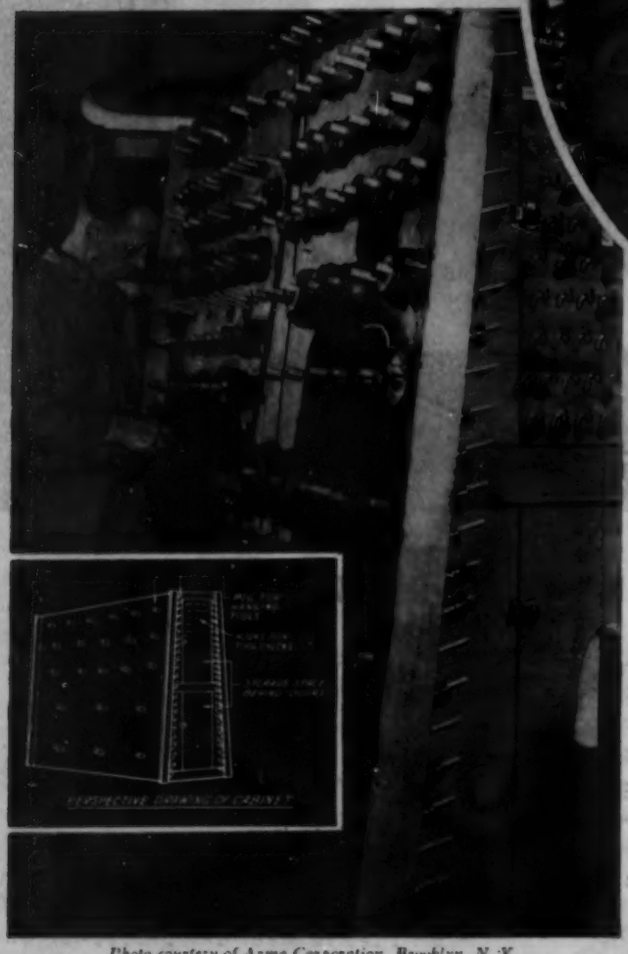


Photo courtesy of Arma Corporation, Brooklyn, N. Y.

Dead Space usually found in center of crib utilized by double deck "slanting-side" cabinet. Tools hang on sides, bulky items are stored inside. Doors are used for "in and out" tool checks.

AND Saves Space TOO!

Perhaps you've been thinking, "Yes, I'd like to plan my tool crib to take better care of my tools — but the plant can't give me more floor space."

Then you'll be interested in seeing how some plants improved their tool storage, and saved space too!

As these photographs show, space may be saved by:

1. **Rearrangement of storage facilities.**
2. **Alteration or substitution of equipment.**
3. **Utilizing waste floor or wall space.**

Yes, your tool crib can pay big rewards for a little careful thought.

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ARMY E NAVY

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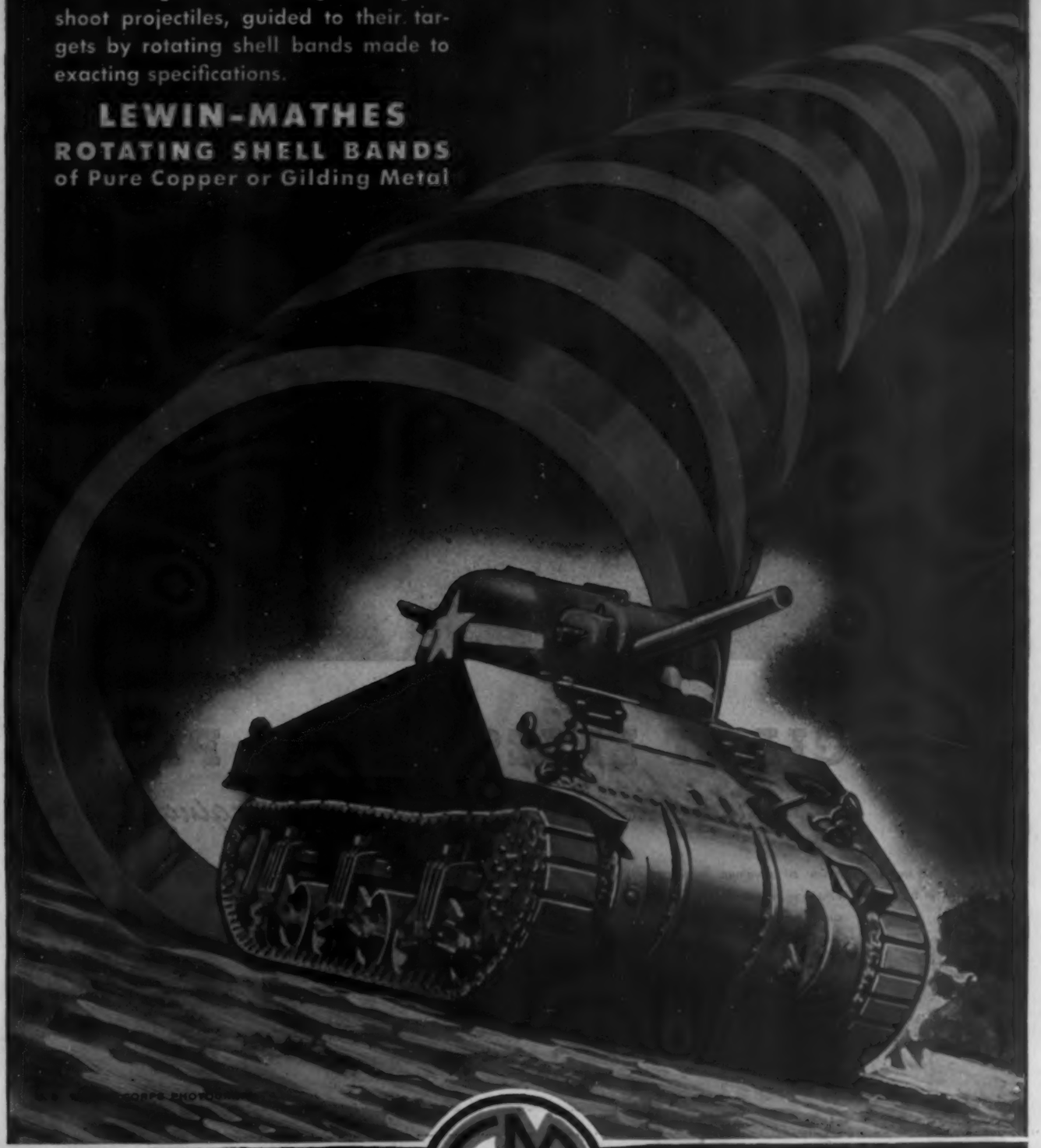
Those large hard-hitting tank guns shoot projectiles, guided to their targets by rotating shell bands made to exacting specifications.

LEWIN-MATHES
ROTATING SHELL BANDS
of Pure Copper or Gilding Metal



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Work 168 Hours a Week on War Forgings

** The largest producer of aluminum forgings in the country uses Erie Hammers almost exclusively.*

YOU cannot watch a great Erie Hammer in action without gasping for words to describe it—imagine 16 of them in one plant pounding out sturdy aluminum forgings for planes—168 hours a week. That variable pitch propeller blade will be tough and hard, light and sleek and require a minimum of machining. Props and other parts by the thousands, forged on Erie Hammers, are furnishing the extra stamina required at vital points—the factor of safety that means victory to our air fighters.

That trio above at a 35,000-pound Erie Hammer operate one of the most responsive, most powerful drop hammers that has ever been built. This company,* operating 16 Eries somewhere in the U. S. A., is the second largest producer of aluminum forgings in the country.

Erie's complete facilities are devoted to war work.

ERIE

ERIE FOUNDRY COMPANY

ERIE, PENNSYLVANIA

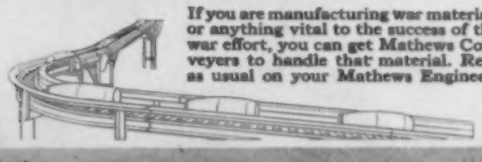
ERIE BUILDS *Dependable* HAMMERS

...and *Pass* THE AMMUNITION!

PASSING AMMUNITION FASTER through production stages . . . speeding it into the hands of America's fighting forces . . . that's a Mathews Conveyer job!

In your plant, if there is any lag in moving materials to and from men or machines, perhaps a Mathews engineer could point the way to improving this condition.

Mathews Conveyers are available for critical war materials . . . there is no surer way to shorten the war than to speed Victory at its source!



If you are manufacturing war material, or anything vital to the success of the war effort, you can get Mathews Conveyers to handle that material. Rely as usual on your Mathews Engineer.

MATHEWS CONVEYERS FOR MECHANIZED PRODUCTION

MATHEWS CONVEYER COMPANY ELLWOOD CITY PENNSYLVANIA

On many fronts our air-borne invaders are striking terror in the hearts of our enemies. For war today is three-dimensional, and mountains, deserts, seas and fortifications offer no obstacles to U. S. Paratroops.

Transporting armies through the air is a big job—a job that calls for big planes and big engines. Today, engines of 2,000 horsepower are commonplace. Already on testing blocks, in manufacturing departments and on drawing boards, in engine plants throughout the country, is the promise of engines that will dwarf even these giants.

And transmitting the power from these engines are gears of such light weight—of such extreme precision, metallurgically and dimensionally, that engineers marvel that they could be produced by mass production methods.

How the problems that were presented in their design and manufacture were overcome is a military secret. But the mounting figures of our aircraft production is proof that here at Foote Bros. these precision gears are rolling off production lines in an amazing volume.

When the war is won, these same gears give promise of revolutionary advantages in the design of machinery—advantages that will mean "better power transmission through better gears."

FOOTE BROS. GEAR AND MACHINE CORPORATION
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CHICAGO

To assist Paratroops in receiving arms, ammunition and supplies instantly, colored parachutes are used. Pictured here are men and equipment descending upon a foreign airfield.

FOOTE BROS.

Better Power Transmission Through Better Gears

750 ton open gap HydroLectric flanging press. 8' 0" gap; 4' 6" daylight; 12' x 8' table with extensions. Vertical ram, 750 tons with 42" stroke; Horizontal ram, 400 tons with 30" stroke. Welded steel "C" frame.

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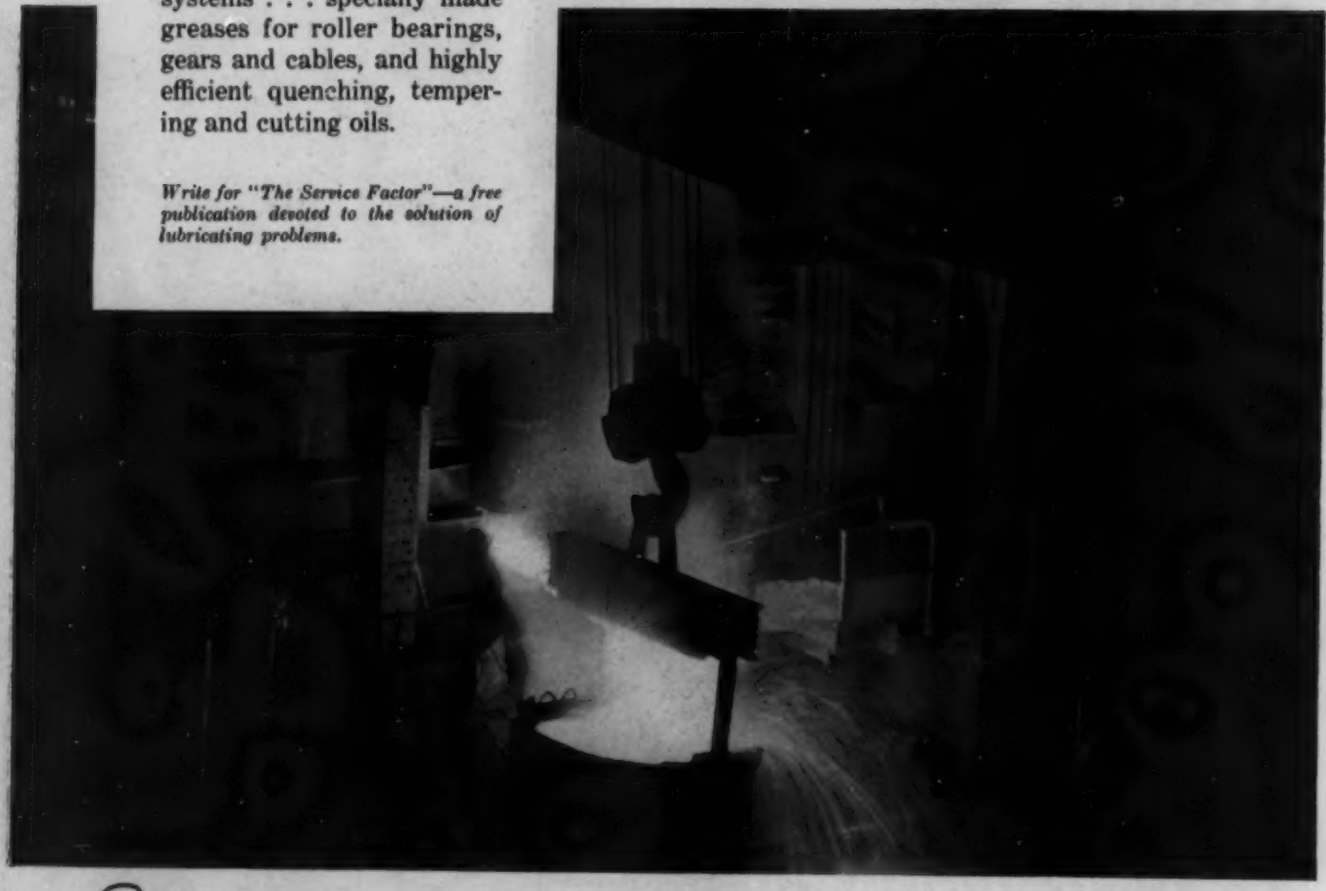

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How to Save Time in GETTING TUBING!

"AS WELDED" SIZES—ELECTRUNITE TUBING

O. D. OF TUBE	WALL THICKNESS (B. W. Gauge)				
	MECHANICAL TUBING	PRESSURE TUBING	STAINLESS TUBING	AIRCRAFT TUBING	
				SAE 1025	SAE X-4130
⅜"			16 to 22	18 to 22	18 to 20
7/16"			16 to 22		18 to 22
½"	16 to 22		16 to 22	16 to 22	16 to 22
9/16"					16 to 22
⅝"	16 to 22	16 to 20	18 to 21	16 to 22	16 to 22
11/16"	16 to 22	16 to 20	16 to 20		
¾"	14 to 22	14 to 20	14 to 20	16 to 22	16 to 22
13/16"	16 to 22	16 to 20			
⅞"	14 to 22	14 to 20	14 to 20	16 to 22	16 to 22
1"	13 to 22	13 to 20	14 to 20	14 to 20	16 to 20
1⅛"	13 to 22	13 to 20	14 to 20	14 to 20	16 to 20
1¼"	11 to 22	11 to 20	14 to 20	13 to 20	16 to 20
1⅜"	13 to 22	13 to 18	14 to 20	13 to 20	16 to 20
1½"	10 to 21	10 to 18	14 to 20	13 to 20	16 to 20
1⅝"	11 to 20	11 to 16	14 to 20	11 to 20	16 to 20
1¾"	9 to 20	9 to 16	14 to 20	11 to 20	
1⅞"	9 to 20	13 to 16	14 to 20	11 to 18	
2"	7 to 20	7 to 16	14 to 20	10 to 18	
2⅛"	13 to 22	13 to 16	14 to 19	13 to 18	
2¼"	6 to 20	6 to 16	14 to 18	9 to 18	
2⅜"	6 to 20	6 to 16		9 to 16	
2½"	5 to 20	5 to 16	14 to 13	9 to 16	
2⅝"	5 to 13	5 to 13			
2¾"	5 to 18	5 to 16	14 to 17	9 to 16	
2⅞"	5 to 12	5 to 12			
3"	4 to 19	4 to 16	14 to 17	9 to 16	
3⅛"	12 to 18	12 to 16			
3¼"	4 to 18	4 to 16		9 to 14	
3½"	4 to 16	4 to 16		9 to 14	
3¾"	12 to 16	12 to 16			
4"	7 to 16	7 to 16		9 to 14	
4⅛"	13 to 16				
4½"	7 to 12	7 to 12		9 to 14	
4¾"	7 to 12				
5"	7 to 16	7 to 12		9 to 14	

RAIL CARBON STEEL TUBING
FOR STRUCTURAL APPLICATIONS

O. D.	WALL	O. D.	WALL
.840"	.056 to .103"	1 15/16"	.072 to .118"
1"	.056 to .086"	1⅝"	.090 to .191"
1.05"	.056 to .144"	1.66"	.095 to .194"
1¼"	.073 to .086"	1.9"	.097 to .190"
1.315"	.082 to .178"	2.375"	.102 to .195"
1½"	.082 to .155"		

● With tubing in greater demand today than ever before—because of its increasing use in wartime production—deliveries cannot be made as promptly as before the war, even with the increased capacity available today.

But you can save valuable time in getting the electric resistance welded tubing you need by: (1) designing to the sizes and gauges listed at the left; or (2) changing specifications to one of these sizes.

These are the sizes of Republic ELECTRUNITE Tubing which can be made by welding direct to size. Intermediate sizes, smaller diameters and heavier wall thicknesses may also be obtained—but they require cold drawing, hence more time to produce, and the use of equipment now heavily scheduled. Square, rectangular and special shapes are available, too, within a limited range.

Look over your products and specifications which incorporate tubing. Change or request a change wherever possible to "as welded" sizes of Republic ELECTRUNITE. You'll save time when time is vital. And you'll enjoy the ELECTRUNITE advantages of consistent uniformity in diameter, wall thickness, concentricity, strength, weight, ductility, hardness, weldability and scale-free surface which help speed fabrication and improve product quality.

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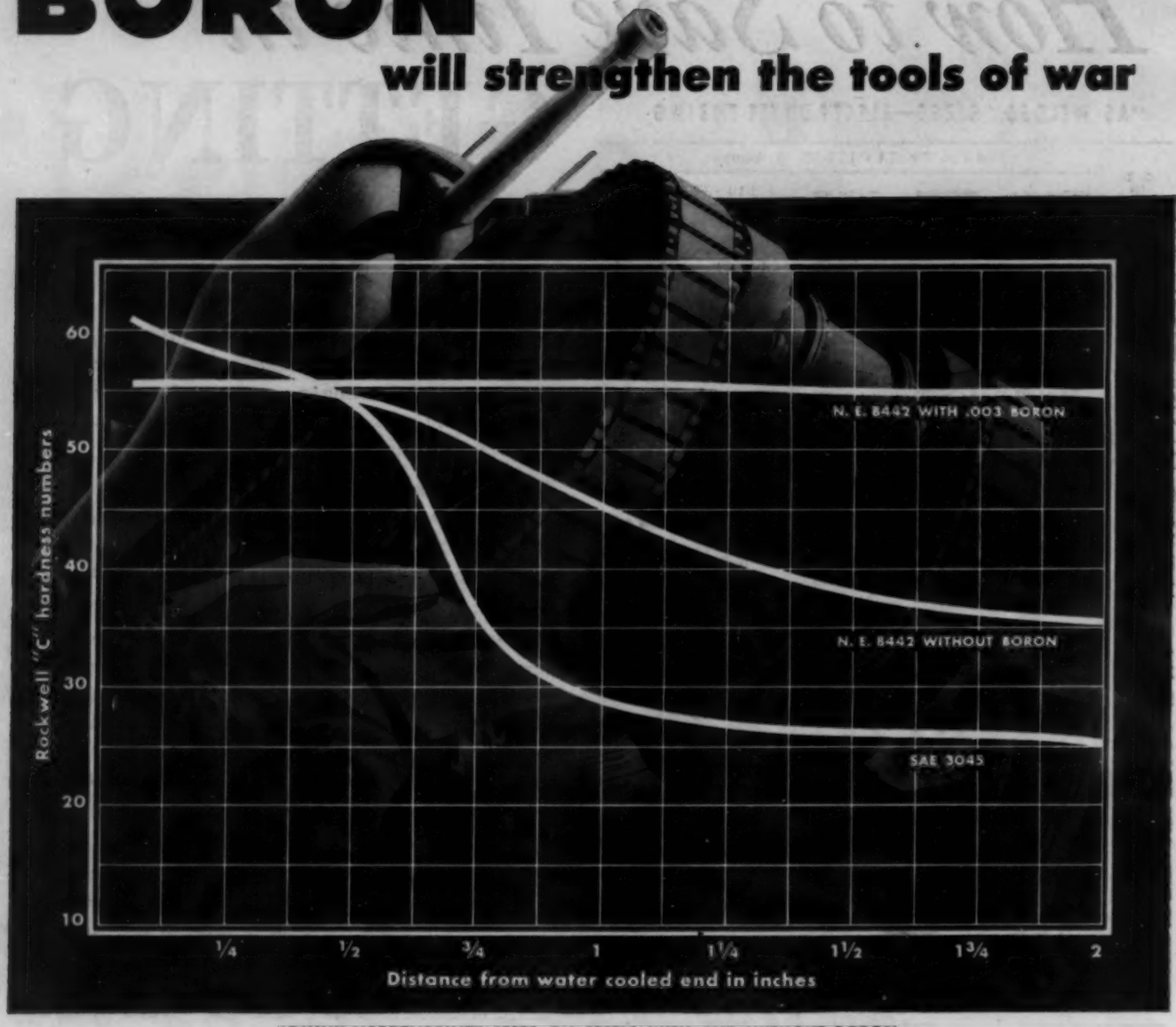
ELECTRIC RESISTANCE WELDED TUBING

BORON
will strengthen the tools of war



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Boron is used to enhance the properties of armament steels, in rapidly increasing volume.

By far the most economical form in which Boron as an alloying element can be incorporated in ferrous metals, is a new ferro-boron developed through extensive research by the Molybdenum Corporation of America. Thousands of tons of boron-treated steel have been turned out by leading steel manufacturers, who confirm the laboratory reports of uniform distribution and high recovery. These results are obtained by regular open-hearth practice. Very definitely, therefore, the method makes it possible, by proper use of Boron, to cut down the requirement of scarcer materials, and still to meet exacting specifications.

On the availability and uses of Boron, Tungsten, or Molybdenum, correspondence is invited by the Molybdenum Corporation.

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Offices: Pittsburgh, New York, Chicago, Detroit, Los Angeles, San Francisco, Seattle.
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CORPORATION OF AMERICA
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Ol' Red Wabbler says:

You can get a premium metal at a standard price . . .

WHY PAY MORE ? ? ? ? ?

Mackintosh-Hemphill Techniron for castings is a premium cast iron of a close grain which is uniform throughout variable sections of the casting. It machines readily, easily. The finished castings are strong, having high resistance to shock.

M-H Techniron castings are being used for planers, lathes, rams, and many other precision machine parts.

When you need heavy iron castings specify M-H Techniron. You'll get premium metal at a standard price.

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PITTSBURGH AND MIDLAND, PENNA

M-H TECHNIRON for castings

where exceptional quality

is essential

Other Mackintosh-Hemphill Products:

Rolling Machinery . . . Shape Straighteners . . . Strip Coilers . . . Shears . . . Levellers . . . Pinions . . . Special Equipment . . . Iron-Steel Castings . . . The NEW Abramsen Straightener . . . Improved Johnston Patented Corrugated Cinder Pots and Supports . . . Heavy Duty Engine Lathes.

EXPERTS *not required!*

You can train inexperienced men or women in a comparatively short time to obtain quantity and quality production on Monarch lathes without undue fatigue. This is because Monarch engineers have always considered *simplicity of operation* to be a basic factor of design.

Such characteristics as simplified control of speeds and feeds and thread chasing . . . ease of mounting plates, chucks or fixtures on spindle . . . automatic lubrication of all major units . . . large diameter, direct reading micrometer dials and other features remove the strain of learning, shorten training periods and result in more rapid progress toward quality production.

With this background, operators can take quick advantage of Monarch production lathes, toolmakers' lathes, Monarch-Keller automatic forming turning machines and Monarch automatic sizing lathes, all of which are doing important war work in plants throughout the world.

With the pressure on all of us to produce "faster for fighters", we suggest that you review the versatility of Monarch lathes and the wide variety of work which they can do in your plant as they are doing so successfully in other plants. If our engineers can help you, they are at your service.

THE MONARCH MACHINE TOOL COMPANY · · · SIDNEY · OHIO

MONARCH LATHES

COVER THE TURNING FIELD

Glass gages win approval on accuracy, visibility and thermal reactions. *Page 70*

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STEEL

The Magazine of Metalworking and Metalproducing

MARCH 29, 1943

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An Actual Example of the Time-Saving Gains of the Graybar MM Plan*

As the engineering department for an important war project became more and more overworked. it found it necessary to "pass the buck" to the purchasing staff. Blueprints were approved without drawing off a list of materials. and the purchasing department was told to "get us what the prints require".

Soon, the purchasing department had its own manpower crisis. Delays in ordering arose which threatened a construction slowdown.

At this point, the GRAYBAR Man come into the picture. By offering to draw up the list of electrical requirements right off the prints, he opened up a way to relieve the pressure. Typed on a requisition pad, the list was quickly reviewed by the buyer and the purchase order issued with virtually no change.

The electrical supplies reached the job on time. Record-keeping and billing were simplified by a single order to a "one-call" source.

***Serving as your MATERIALS MOBILIZER**

. . . on electrical supplies, GRAYBAR makes its procurement experience a part of your war production facilities. In less than one hour, your GRAYBAR Procurement Adviser can review the *four-point plan* which "dovetails" your electrical needs with the available production of more than 200 electrical manufacturers, distributed locally from more than 80 warehouses. Why not call your local GRAYBAR office about it today?

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IN OVER 80 PRINCIPAL CITIES

Everything Electrical
. . . . THAT IT TAKES TO WIN!

HIGHLIGHTING

this issue of STEEL

LABOR Recommendation by the WPB Steel Division's labor advisory committee that the 48-hour week be made mandatory throughout the steel industry is interpreted (p. 34) as an attempt to circumvent the "Little Steel" wage formula, by granting steelworkers a bonus in the form of more overtime pay. The War Labor Board meanwhile has reaffirmed the formula and has indicated that the dispute between John L. Lewis' coal miners and the operators must be settled in accordance with it. Northern operators and the UMW last week agreed to continue operations for 30 days after expiration of the contract. . . Employers in the suburban Chicago area have protested the inclusion of their district in those designated as having a labor shortage (p. 34). . . The huge Gary, Ind., steel mills, with capacity equal to Japan's entire steel industry, (p. 63) employs women effectively in many jobs.

AIRCRAFT Failure to reach production goals expected of such huge war plants as the Willow Run bomber plant (p. 51) is being blamed on shortage of managerial personnel. This is not surprising when it is considered the aircraft industry (p. 47) now holds war contracts amounting to 70 times its 1939 sales. . . A remarkable job in distributing materials to aircraft contractors is being accomplished by the Aircraft Scheduling Unit. Materials Distribution Branch at Wright Field in the past eight months reduced from 6000 to 470 the number of critical material shortage cases.

POSTWAR PLANNING An influential member of the House emphasizes (p. 42) that rigid government control over business and individuals must be relaxed soon after the war. These restrictions should be removed gradually to prevent upsetting the "economic applecart". . . National Resources Planning Board's "loose thinking" in postwar transportation problems was assailed before shippers of the Great Lakes region (p. 136).

IN THE NEWS Top executives of United States Steel Corp. were "shocked" by last week's revelation of lax testing of steel plates for shipbuilding (p. 32) and said the persons responsible would have to "walk the plank." The fault was laid to over-zealous underlings.

Standard specifications for carbon steel plates (p. 49) has reduced the number that may be produced from several hundred to about 25.

United States Steel Corp. had the greatest income from sales and paid the largest amount in wages in its history in 1942 (p. 63); earnings of the owners, however, were among the lowest ever recorded.

CONSTRUCTION Seventy per cent of the Defense Plant Corp.'s projects already are in operation (p. 46). Eight hundred of the 1022 plants now in production were started after Pearl Harbor. . . Total construction volume in the United States (p. 47) declined 14 per cent from December to January. . . Brazilian nickel ore will be refined (p. 47) in a new pilot plant in this country.

TECHNICAL Colonel H. B. Hambleton tells how glass has many advantages as a material for gages (p. 70). In addition, the greater lightness and visibility of such gages permit gaging speeds to be increased as much as 50 per cent.

J. Sorenson this week contributes report No. 12 in STEEL's series of articles on the experience of users of NE steels. He describes parts and manufacturing procedure in heavy duty automotive work involving successful applications of NE steels in the 8000 series (p. 72).

Much valuable information collected by Joseph T. Ryerson & Son Inc. on the practical application of the NE steels is presented as a further aid in the selection of an alternate NE steel (p. 76). Help in interpreting the Jominy end-quench hardenability test results is also afforded by a number of unique tables that tie the various physical properties together in a useful manner.

J. F. Lincoln presents a timely discussion of the factors that may lead to breakage of welded steel ships and what can be done to prevent such failures. Unequal expansion of shell and deck, he points out (p. 84), is the probable cause of all cases of known failures.

In his study of blast furnace metallurgy, C. D. Smith has developed a number of unusual charts (p. 86) that correlate various factors of furnace performance in a most interesting manner. He presents quantitative information on trends in furnace operation which most operators appreciate but perhaps have not had the opportunity to collect in such a usable form.

Harold Lawrence begins his series of articles on the metallurgy of spot welding by discussing some of the metallurgical factors involved (p. 100). The increasing importance of resistance welding makes this series most timely.

Millions are "*Injured*" by a Single Accident

Not so many months have passed since an accident meant little more than some personal loss and a temporary, but easily adjusted, work schedule. Today, that situation is completely changed.

Every accident of the 9,000,000 that occur annually is a national liability, affecting, not only the output of the injured worker's shop, but also the production of other shops. Yes, a single accident "injures" millions —millions of other workers who are trying desperately to reach maximum war output—millions of American citizens who are striving to retain their freedom—millions of American fighting men who never can have all the equipment and supplies they need for Victory so long as America is careless on the home front. Anything you can do to prevent accidents will be a real contribution to America's fight for freedom. Remove hazards at home, drive carefully, be considerate of others in traffic, observe safety rules when at work, promote safety and safety programs no matter what your position may be.

Start today! Think safety, promote safety! Keep more workers on the job for Victory!

ARMY E NAVY

Enlist today in America's great crusade against accidents. For complete information write to the National Safety Council's War Production Fund to Conserve Manpower, Chrysler Building, New York City

INLAND STEEL COMPANY

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STEEL
March 29, 1943

Eternal Vigilance—Now!

Thus far in the present war a half-dozen or so instances have come to light wherein companies in the iron, steel and metalworking industries have been charged with supplying materials to the government which did not conform to specifications.

Several of these cases involved small companies and received little more than local attention. Two cases, uncovered in two widely separated plants of a large manufacturer of copper wire, were given a moderate amount of national publicity. The most recent case, involving a large producer of steel plates, not only was aired before a congressional investigating committee but also was reported in detail by radio and newspaper to a large portion of the American public.

Every person identified with industry deplores these occurrences. In the first place, to cover up mistakes by faking tests not only is dishonest but it is absolutely unnecessary. It is only natural that certain heats or certain batches of finished material will fall short of specifications. If the discrepancy is so marked as to indicate dangerously faulty material, the steel is scrapped without question. If it is close, but not up to specifications, then the supplier can ask the customer if he will accept it. If the customer will not take it and the steel is acceptable for other uses, it can be disposed of elsewhere. No usable steel needs to be scrapped under conditions prevailing today.

Adherence to this simple policy not only will insure all government contractors against grief, but it will protect industry from the taint of public suspicion.

One of the most regrettable features of faking on government orders is the false impression by the man-in-the-street. He is not likely to know enough of the facts to allocate the blame specifically. He does not realize how really few are the cases of deceit in relation to the total number of opportunities for deceit. He is inclined to blame all industry on the basis of a few errors.

Now, more than ever before, eternal vigilance against deception should be the order of the day for every government contractor.

E. L. Shaner

Editor-in-Chief

Employes' "Fakes" in Rushing Steel Bring Swift Correction

Lax inspection at Irvin works not condoned by U. S. Steel chiefs, "shocked" by disclosures before Senate committee. . . . Slip-up in one department mars great war production record

WASHINGTON

SPECIAL Senate Committee investigating the war program which developed charges of falsified inspection records on some steel delivered from Carnegie-Illinois Steel Corp.'s Irvin Works ended its hearing last week with forceful disavowal of knowledge of such practice by Benjamin F. Fairless and other company officials—and just as forceful a declaration that it had been stopped.

"I intend to clean house, let the chips fall where they may," declared the president of the United States Steel Corp., testifying before the (Truman) committee. Mr. Fairless pointed out that it was virtually impossible for higher officials of the company to know all the details of operations, especially under war pressure. Revelations before the committee, he said, left him and others of the Steel corporation "just as shocked and as desirous of correcting the situation as you are."

Taking cognizance of the implications that ran through preceding testimony that war pressure was the dominant motive of the laxity, Mr. Fairless nevertheless stated that he could not condone certification of substandard metal. It was entirely unnecessary for employes to resort to any such practices, he pointed out.

"If steel lacked the ability to meet the specifications, the thing to do was to call up the customer, explain things and ask, do you want us to ship this, or not?"

He replied to a question from Senator Ferguson, Michigan, as to whether he considered what had been related as "good management" with an emphatic, "I do not!"

"Those responsible, whether they are underlings, intermediates or at the top, will have to walk the plank." Most of the subsidiary's officials and technical employes who had been implicated by testimony, were in his hearing when he said it.

However, a day-long effort by the committee and its hard-hitting special counsel, Hugh Fulton, failed to involve directly any of the personnel above the chief metallurgist, William F. McGarrity. Mr. McGarrity refuted allegations by subordinates that he had given instructions to "ease up" on rejections or similar orders. Instead, he declared, there was to be "no let-up."

He knew of difficulties, and that some heats could not be traced, he said. He admitted responsibility lay within his department for the actions of his men. Two of these were the principal witnesses.

J. Lester Perry, president of Carnegie-Illinois, stated emphatically that lax practices at his plant were not brought to his attention, and assured the committee of corrections.

Specific charges were contained in statements signed by George E. Dye, employed as supervisor of inspection at Irvin since January, 1939, who wrote: "Since July, 1942 I have been aware that the mill was shipping badly lami-

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WHY EXECUTIVES GET GRAY: U. S. *Steel President Benjamin F. Fairless was as "shocked" as the committee at the revelations. "Whoever is responsible, whether they are underlings, intermediaries, or tops, will have to walk the plank," he declared. NEA photo*

nated and piped plates to U. S. Navy and U. S. Maritime shipyards and that defective steel was being supplied on U. S. Treasury Lend-Lease orders."

He alleged further that he repeatedly brought such conditions to the attention of various superiors whom he named, but "no appropriate measures have been taken to prevent shipment of bad plates."

He wrote that he later referred this matter to Mr. McGarrity, the chief metallurgist, "and was instructed to reject all the bad plates." Later still however, Dye declared, he was "instructed to go easy on rejections." He indicated that he got such instructions from John McConnell, sheet mill metallurgist.

Charges also were made in a statement signed by Robert Kinnard, employe, who wrote that on instructions, he "pulled up" tensile tests of pieces at the plant. Also both Kinnard and Michael Tarella, employed as general foreman at Irvin, made statements that they had received instructions to "pull up" tensile tests, and that such instructions came from McConnell or from McConnell's assistant, D. B. Ireland. Tarella stated that approximately 5 per cent of the tests represented "fake recordings."

McConnell and Ireland, appearing jointly before the committee, admitted that steel had been "pulled in" when near the specification points, as much as 2000 pounds being "pulled in" when a piece was "sufficiently close" to specification.

A statement was put in the record, signed by Miss Irene T. Pasternak, who was in charge of the heat analysis book at Irvin in which she explained "how heat records were falsified":

Fake Analysis for Inspector

"For example, 216098 could be read as 216693. Not having an analysis for 216693 and unable to convince the inspector it is actually 216093, an analysis corresponding to chemical analysis of 216093 is used. The analysis is made up to satisfy the inspector. I was advised by my supervisor, M. E. Stewart, to do this.

"These heat numbers get transposed because the men working in the mill do not know what a heat number is and in the process of copying and re-copying from records originating in the slab yards these heat numbers lose their identities. The pencil analyses in the book are the made-up analyses. Prefix F means fake.

"When an ink analysis has been changed, that is because it is not within specification and we supply a pencil analysis that meets the specification. We make up these pencil analyses and these are fake."

Senator Truman and other committee members contended that higher company officials, such as Mr. Perry, company president, should have been made suspicious of what was going on by the absence of such normal rejections.

Mr. Perry, who preceded Mr. Fairless on the stand, read a prepared statement in which he said:

Management Not Involved

"The only explanation which can be given for the failure to carry out prescribed testing procedures is that a few individuals responsible for the making of the tests, having an intimate knowledge of the high character of the steel and honestly believing that the plates in question would fully meet all requirements, grew lax under the pressure of the heavy production in the proper performance of their specified duties."

He emphasized that "Carnegie-Illinois Steel Corp. at all times has devoted its best efforts to the production of high quality steel for the nation's war effort," and further, that "the higher management of this company is in no way involved in these deviations" from established testing procedure.

Mr. Perry said that whatever may have been the case with other plate shipments, no faulty plate was allowed to go to the Navy armor plant at Charlestown, W. Va., or other such vital production. He introduced an expert witness to refute charges that the recent crack-up of a Kaiser-built tanker was attributable to a faulty plate that was alleged to have come from the corporation's Homestead or Irvin plants.

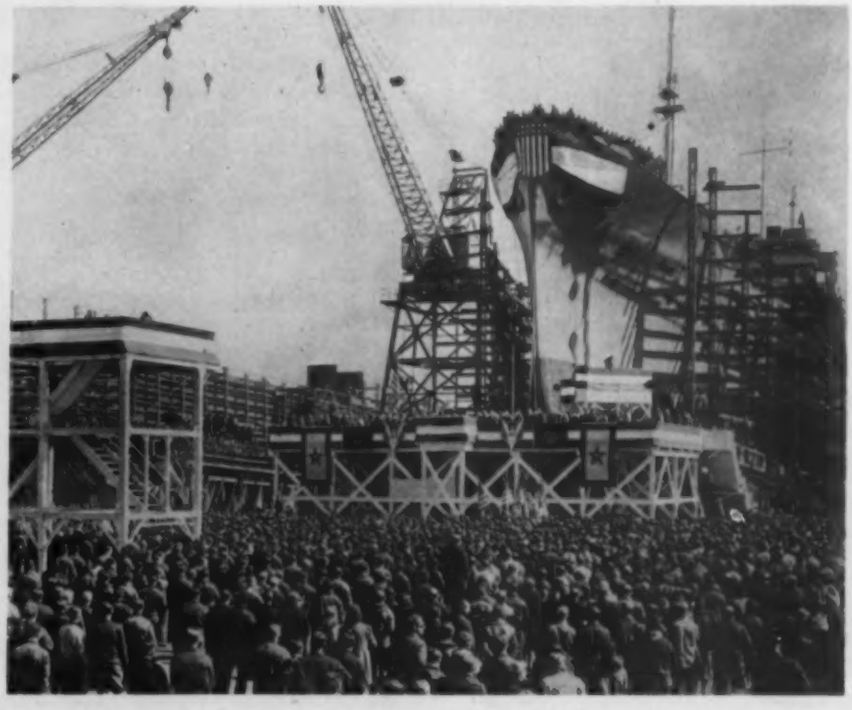
Responsible officials of the Department of Justice, who refused to be quoted, said Thursday they will seek indictments as a result of the disclosures.

Sequel to the hearing was an "informers'" suit filed in federal courts in Chicago and Pittsburgh by Herman M. Cogan, a Chicago attorney, against Carnegie-Illinois and certain of its employes, asking for damages on behalf of the people of the United States.

Mr. Cogan's suit claims that the falsification of specifications resulted in "irreparable damage to the people of the United States as a result of delivery of inferior steel for the war effort".

Total "damages" as estimated by Mr. Cogan amount to $1,000,000, although he asks for double indemnity under an old law enacted about the time of the Civil War, which provides that any citizen may file suit on behalf of all citizens for alleged damages.

It is understood Mr. Cogan is not representing the government and has no interest in the case other than that of a citizen and the fact that if the charges are proven and damages awarded, he is entitled to a percentage of proceeds.



Shipbuilding and launchings were not slackened by the committee's investigation. Above is shown one of three tankers launched within 20 minutes by the Sun Shipbuilding yards at Chester, Pa., soon after the company was awarded the Maritime Commission's "M" pennant. NEA photo

48-Hour Week Proposal Seen as Effort To By-Pass Wage Formula

RECOMMENDATION that the 48-hour week be extended throughout the steel industry, made to the WPB Steel Division by its labor advisory committee, is interpreted by industry spokesmen as an effort to circumvent the "Little Steel" wage formula.

Proposal was made by Philip Murray, president of the CIO and the United Steelworkers of America, and six other members of the committee, all members of the United Steel Workers.

To date, the 48-hour week has been ordered only in those areas designated as having critical labor shortages and affects few steelmaking centers—Detroit, Buffalo, Gary and Baltimore.

Effect of 48-hour week for the industry would be to give wage earners a bonus of from $100,000,000 to $120,000,000 for overtime work. It could not increase steel production as basic steelmaking facilities have been operating at virtual capacity for many months. In fact, a longer work-week might possibly lower efficiency of the individual to a point where total production would be lowered. Total output can be raised only by adding new plant units, which is being done all the time.

The "average" steel wage-earner, according to latest available figures (January), works 39.2 hours a week and receives 110.7 cents an hour, or a weekly wage of $43.39. If this "average" worker's work-week were stepped up to 48-hours, his indicated weekly wage would be $57.56, by virtue both of the extra 8.8 hours worked and the time-and-a-half pay for all over 40 hours a week. The percentage increase in weekly wages would be 32 per cent, an inflationary influence.

Thus, while receiving no increase in basic hourly rates, and theoretically staying within the "Little Steel" formula, the worker's income and the industry's labor costs would be appreciably raised.

The increased cost to the industry, of course, would be largely passed on the government, either through contract prices or taxes.

What action is taken on Mr. Murray's recommendation probably will depend to large extent on whether high administration officials believe they have paid off their debt to the CIO.

Mr. Murray contended that from 90,000 to 100,000 workers in the basic steel industry have been absorbed by the armed services and that more will be drafted in the months to come.

Industry spokesmen said that every employe in the industry could be immediately placed on a 48-hour week without formal action by the government, if conditions warranted. In some departments, workers already are working 48 or more hours a week, and the only reason more departments are not is that requirements do not warrant such action.

They point out that whereas steel production has held at practical capacity, total steel employment dropped from last summer's peak of 655,000 to 633,000 in December. This was caused in part by the drafting of employes, as the union spokesmen contend, and also by the shift from high-man-hour products to low-man-hour products. It takes about 40 man-hours to produce a ton of tin plate, only 16 to make a ton of heavy plate. War demands have raised the ratio of heavy to light products.

If the 48-hour week were made mandatory and the entire industry were forced to work all employes 48 hours a week and pay them 8 hours overtime, a serious disruption in production schedules would result. Fewer employes would be needed and probably between 40,000 and 50,000 would be laid off.

STEEL EMPLOYMENT, WAGES, HOURS WORKED

1941	Employes	Payroll Total (dollars)	Average Earnings (cents)	Average Per Week
October	646,000	118,890,000	98.3	40.0
November	645,000	109,856,000	99.0	37.6
December	646,000	117,221,000	99.9	38.2
1942				
January	651,000	118,785,000	99.2	39.2
February	651,000	108,563,000	99.5	39.0
March	653,000	116,998,000	100.1	38.1
April	654,000	118,568,000	100.4	39.7
May	656,000	117,403,000	101.1	37.7
June	659,000	118,067,000	102.0	38.7
July	655,000	120,671,000	102.7	38.4
August	647,000	118,718,000	104.1	37.6
September	641,000	124,777,000	108.6	39.8
October	635,000	126,627,000	107.7	39.9
November	632,000	122,816,000	109.3	39.4
December	633,000	129,368,000	109.4	40.2
1943				
January	637,000	129,760,000	110.7	39.8

Suburban Chicago 48-Hour Week Protested by Employers

Protests against War Manpower Commission's order of March 18 placing the Calumet district in Group I denoting acute labor shortage, thereby making the 48-hour work week mandatory effective May 1, and classifying the rest of the Chicago area as Group II, may result in rescinding or modifying the order. The protests from management, labor and business organizations were carried to Paul V. McNutt, WMC chairman, and brought from him a promise that the pleas will be considered and corrective action taken if justified.

A delegation told Mr. McNutt there is no shortage of manpower in the Chicago area at present and no sharp decrease in labor supply is expected in the immediate future. Mr. McNutt pointed out that WMC has confidential Selective Service quotas contemplated for the area, as well as confidential production and employment figures not usually available to non-governmental bodies. However, he accepted the delegation's figures for comparison purposes and said that any mistakes disclosed by them would form the basis for corrective action.

The commission's order, which was issued from Washington without warning, and without prior consultation with the eight-man Chicago area manpower advisory committee, would affect approximately 258,000 employes in the Calumet district alone. This area includes all the steel plants, large chemical plants, oil refineries, and numerous heavy war industries.

The order would affect workers in the various communities as follows: Gary, 48,000; East Chicago, including Indiana Harbor, 56,000; Hammond, 17,500; Whiting, 11,500; Harvey, including Chicago Heights, 35,000; Blue Island, 25,000; Calumet City, 15,000; and the area inside Chicago proper, 50,000.

Spokesmen for steel plants thus far have declined to make any statements on the order. It is understood, however,

that only about 55 per cent of steel plant workers are at present on a 48-hour schedule, despite the fact operations are on a full-capacity basis. Consequently, management is confronted with a sizable task to readjust its schedules to put all workers on the longer work week.

Commenting on the order, Dean W. H. Spencer, Chicago regional director, WMC, says three things must be done: 1. A substantial number of women must be drawn into industry; 2. A substantial number of workers must be shifted from less essential industry to war work; and 3. Industry and labor must take action to stabilize the labor market—to stop pirating of workers, cut down absenteeism, prevent competitive bidding for labor, etc.

A voluntary rather than compulsory stabilization plan is being sought, and the plan will be considered further by the advisory committee in an attempt to obtain unanimous consent of the committee.

Industrial areas in which labor shortages have become acute now number 36, four more than a month ago, according to a new classification by the War Manpower Commission. Three communities—Akron, O.; Bath, Me.; and Portsmouth, N. H.—however, have been shifted from the shortage list to the group of areas in which there is a present balance of labor supply and demand.

The communities added to the list of shortage areas are Portland, Me.; Burlington, N. C.; Evansville, Ind.; Gary-Hammond-South Chicago, Ind. and Ill.; Tampa, Fla.; Savannah, Ga.; and Wilmington, N. C.

Parents of Hero Quintet Visit Inland Steel Plant

Indiana Harbor plant of Inland Steel Co. was visited recently by Mr. and Mrs. Thomas F. Sullivan, Waterloo, Iowa, whose five sons were lost in the sinking of the USS Juneau off Guadalcanal. Shown on the platform (left to right) during ceremonies in their honor are Lieut. Kenneth Taylor, U. S. Navy, Mr. Sullivan, Genevieve Sullivan, and Mrs. Sullivan.

A "three-way memorial" salute to the five brothers was tendered by workers turning out "pocket airfields" in the Long Island City, N. Y., plant of the Irving Subway Grating Co. Workers there produced 180 emergency landing mat panels, equivalent to 4500 square feet, over their required quota for the day, as a tribute. These were earmarked for "Sullivan Field." The extra mats, a good portion of a runway, represent a full hour's output for each man—equivalent to $472.50 in wages. A check for this amount was sent as a contribution to the Waterloo sponsors of the Sullivan Memorial Fund.

At the same time, a telegram was dispatched to Secretary of War Stimson, requesting an airport, "somewhere on the Pacific battlefront," be laid down and named in honor of the Sullivan brothers.

INDUSTRY, FARM, LABOR LEADERS DISCUSS MANPOWER

REPRESENTATIVES of labor, agriculture, industry and government discuss general manpower problems in Washington. Left to right, seated: Frederick C. Crawford, president, National Association of Manufacturers and of Thompson Products Co., Cleveland; Paul V. McNutt, manpower commissioner; E. A. O'Niel, president, Farm Bureau; and William Green, AFL president. Standing: Philip Murray, CIO president; Eric Johnston, president, Chamber of Commerce of the United States; James Patton, president, Farm Labor Group; A. S. Goss, head of the National Grange. NEA photo

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Construction projects having a total cost of $1,158,819 were halted during the week ended March 19. This figure brings to $1,325,545,454 the total cost of all projects which have been stopped by the War Production Board since the Facility Review Committee was established in October, 1943.

Formula Revised for Computing Ferrochromium Requirements

WAR Production Board last week revised its formula governing ferrochrome requirements for production of stainless steel.

In reporting on form PD-391 the contained chromium required from ferrochrome, and in requesting allocations of ferrochrome on form PD-53B, producers are instructed to use the following formula in presenting their figures on grades of ferrochrome for melting the various grades of stainless steel:

Max Carbon in Melt	% Chromium from Ferrochrome	% Ferrochrome To Be Allocated by Grades						
		0.06	0.10	0.15	0.20	0.50	1.00	2.00
0.08	90	100						
0.10	75	70	30					
0.12	65	50	50					
0.15	55		50	50				
0.20	45			50	50			
0.25	40			25	75			
0.30	40					50*		
0.35	40					60	20	10*
Over 0.35-0.60	40					50	30	20
Over 0.60	40						50	50

*Balance in available grade of ferrochrome under 0.50 carbon.

The foregoing is based on steel in ingot, not on hot metal. In converting figures in terms of products, the following table is to be used:

	Per Cent
Bars	65
Billets, Slabs	72
Sheets	50
Plates	50
Tube Rounds	55
Tubes	43
Strip:	
Hot Rolled	65
Cold Rolled	55
Ingots	100

H. G. Batcheller, director of the Steel Division, pointed out that this merely gives a formula for computing requirements and for making requests for ferrochrome. Actual melting is subject to the provisions of order M-21-a, which permits producers to use in any manner the ferrochrome allocated to them, provided that the overall requirements of that order as to relative use of scrap and ferrochome are complied with.

Second Quarter Steel Orders Not To Be Displaced Under CMP

WPB has protected consumers of steel whose orders have already been placed with mills from displacement of such orders in mill production schedules by orders which already have received allotment numbers under authorized production scheduled, Harold Boeschenstein, director, CMD, announced.

The action, taken in Direction No. 1 under CMP Regulation No. 1, provides that orders already promised by mills for shipment during the second quarter of 1943, shall not be displaced, in the absence of a specific direction to the contrary, by any order (including authorized controlled material orders) received at any time prior to April 15, 1943. The Controlled Materials Plan Division expects that allotment numbers on approved orders will be used by April 15

The direction is designed to protect the consumer of steel who placed his order on or before March 22, 1943, but has not received his allotment number. In effect, it declares a moratorium until April 15, 1943 on CMP allotment numbers coming into steel mills against orders which can only be accepted by displacing order scheduled for delivery.

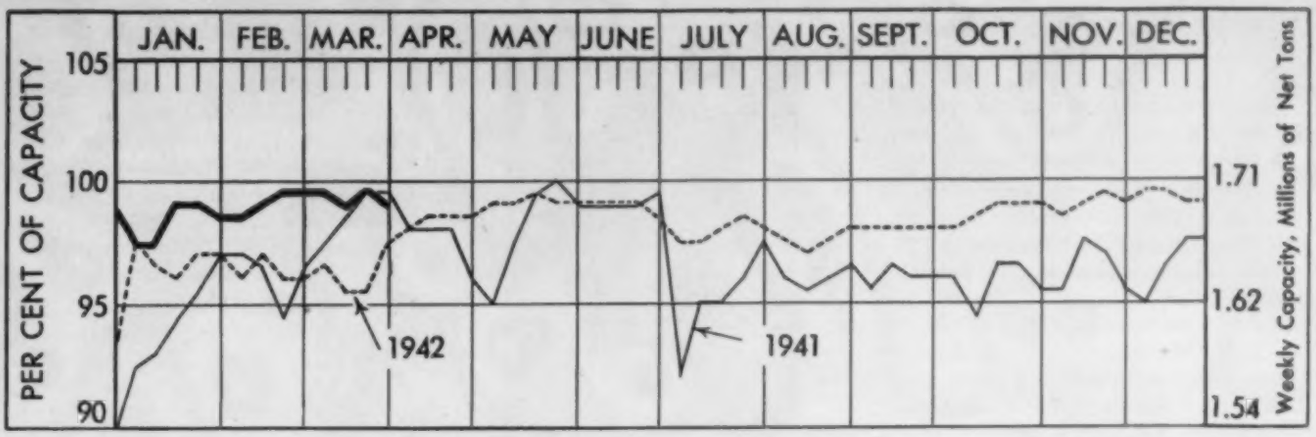
Freeze on Spring Farm Implements Lifted

Government freeze on the remaining items of farm machinery needed for spring plowing, planting, tillage and early cultivation of war food and fiber crops has been lifted. It is anticipated distribution directives for all haying and harvesting machinery will be issued to manufacturers before April 15.

Approximately 75 per cent of all types of rationed farm machinery, which was frozen in the Department of Agriculture's order of Nov. 1, 1942, has now been freed for distribution and local rationing through the county war boards. The freeze was lifted on stock in dealers' hands on Nov. 28, 1942, and on machinery in manufacturers' branch houses, on Jan. 1, 1943. This left for unfreezing at that time only stocks in manufacturing plants which were ready for shipment or in a stage of fabrication and assembly. Sufficient additional materials recently were allocated by the WPB to complete the partly assembled implements and machines in those plants.

AIDES TO "DEATH, DUST AND ASHES"

TWO super block-buster bombs, labeled "Easter Eggs for Hitler," form part of a London parade. Bomb at right weighs 8000 pounds; that at left, 4000 pounds. NEA photo, passed by British censors



STEEL INGOT PRODUCTION BY MONTHS

Net Tons, 000 omitted

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1943	7,408	6,811	....	....	....	....	....	....	....	....	....	....
1942	7,124	6,521	7,392	7,122	7,386	7,022	7,148	7,233	7,067	7,584	7,184	7,303
1941	6,922	6,230	7,124	6,754	7,044	6,792	6,812	6,997	6,811	7,236	6,960	7,150

PIG IRON PRODUCTION

1943	5,194	4,766	....	....	....	....	....	....	....	....	....	....
1942	4,983	4,500	5,055	4,896	5,073	4,935	5,051	5,009	4,937	5,236	5,083	5,201
1941	4,666	4,206	4,702	4,340	4,596	4,551	4,766	4,784	4,721	4,860	4,707	5,014

Ingot Rate 99 Per Cent, Down ½-Point

Production of open-hearth, bessemer and electric furnace ingots last week was at 99 per cent of capacity, ½-point less than the prior week. Four districts made small gains, three reduced and five were unchanged. A year ago the rate was 97.5 per cent; two years ago 99.5, based on capacity as of those dates.

The decline resulted mainly from a loss of 8 points at Cincinnati where high water caused one plant to close for several days, and a drop of 2 points in eastern Pennsylvania where a mill was closed part of the week by labor trouble.

DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week ended Mar. 27	Change	Same week 1942	Same week 1941
Pittsburgh	101	None	96	103
Chicago	99	+0.5	104	101.5
Eastern Pa.	93	—2	90	96
Youngstown	98	None	94	97
Wheeling	88.5	None	82.5	88
Cleveland	92	—3	89.5	99.5
Buffalo	90.5	None	93	93
Birmingham	100	None	95	90
New England	95	+3	80	85
Cincinnati	80	—8	92	97.5
St. Louis	93	+2	83	99
Detroit	94	+2	93	95
Average	99	—0.5	*97.5	*99.5

*Computed on bases of steelmaking capacity as of those dates.

U. S., Britain To Study Dominions' Steel Situation

Survey of the steel situation in certain British Dominions will be made jointly by representatives of the British Iron and Steel Control and the War Production Board, Steel Division Director H. G. Batcheller has announced.

Mr. Batcheller, who was requested by British authorities to nominate an American to accompany Sir John Duncanson, Controller of the Iron and Steel Control, named Earl A. Emerson, president, Armco International Corp., Middletown, O., to represent WPB.

For the purpose of making the survey, which will require visits to India, Australia, New Zealand, and South Africa, Mr. Emerson has accepted a temporary appointment to the WPB staff.

E. A. EMERSON

Survey is intended to make available to the British Iron and Steel Control and to WPB a study of the steel production, steel consumption, and the deficit requirements of each of the Dominions. Arrangements have been made for Sir John and Mr. Emerson to consult with Lend-Lease, BEW, and State Department representatives in the various Dominions to be visited.

Sir John, one of the best known figures in the British steel industry, has just arrived in this country. The trip to the Dominions is scheduled to begin some time in April, and will probably last three months or possibly longer.

Carnegie-Illinois Sets Up Low-Alloy Division

Carnegie-Illinois Steel Corp. has established a low alloy-high tensile steel products division in its sales department, with headquarters in the Carnegie building, Pittsburgh, in charge of M. B. Sunderland as manager of sales. He entered the employ of the Carnegie Steel Co. in 1917 and after service in World War I and with other companies returned in 1931 and since has been associated continuously with Carnegie-Illinois Steel Corp.

Charles F. Dickinson, formerly manager of the sheet and strip bureau, metallurgical division, in the Chicago district, will succeed Mr. Sunderland as metallurgical engineer for sheet and strip in the Pittsburgh district.

MEN of INDUSTRY

H. C. Deckard has been made division manager of the two divisions of Aviation Corp., the Republic Aircraft Products Division in Detroit, and the Northern Aircraft Products Division in Toledo, O. He formerly handled special production assignments at the Ford Willow Run plant on output of Consolidated B-24 Liberators, and before that was associated with Fairchild Aircraft Corp.

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J. E. McFate, heretofore associated with the Pipe Division of Republic Steel Corp. at Tulsa, Okla., has become associated with Republic Supply Co., Houston, Tex., as manager of tubular sales.

—o—

Francis J. Linsenmeyer has resigned as director of mechanical engineering, University of Detroit, to become factory manager and chief engineer, National Stamping Co., Detroit.

—o—

D. W. Champlin, vice president and general manager, Defiance Machine Works Inc., Defiance, O., subsidiary of Toledo Scale Co., Toledo, O., has been elected a director of the parent organization. **Orville Noffsinger** has been elected vice president and a director of Defiance Machine Works. Associated with the company 28 years Mr. Noffsinger has advanced from apprentice machinist to sales engineer and personnel director.

—o—

J. J. Jordan, formerly associated with the sales division of Federal Mogul Corp., has joined True Alloys Inc., Detroit, as director of customer relations.

—o—

E. C. Bullard, vice president and general manager, Bullard Co., Bridgeport, Conn., marked his twenty-fifth year with the firm on March 18. He was guest of the Bullard Foremen's Club at a dinner attended by 200 members and friends.

—o—

Abe Byer, American Compressed Steel Corp., Cincinnati, has been appointed chairman, bundlers' committee, Institute of Scrap Iron and Steel Inc. **Leo J. Kelleher,** Southern Converting Co., Greensboro, N. C., will serve as vice chairman.

—o—

C. B. Rogers, 1000 Peachtree street Northeast, Atlanta, Ga., has been named representative for Ajax Electric Co. Inc., Philadelphia, in Tennessee, Georgia, South Carolina, Florida, Alabama and Mississippi.

—o—

Bernard R. Schneider, formerly assistant chief engineer, Champlain Corp., Garfield, N. J., has been appointed chief engineer, Chicago Pneumatic Tool Co., Hydraulic Division, Garfield. **Anthony Kes,** formerly with Champlain Corp., has become assistant chief engineer for Chicago Pneumatic at Garfield.

H. C. DECKARD

ORVILLE NOFFSINGER

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Sydney P. Lyon, heretofore general manager, Kellett Autogiro Corp., Philadelphia, has joined Wilkening Mfg. Co., Philadelphia, as vice president in charge of production.

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P. C. Booty, assistant superintendent, West Pullman works, International Harvester Co., Chicago, has been promoted to superintendent, to succeed the late H. J. Watling.

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Keith Morey, the past two years chief of plant protection, Buda Co., Harvey, Ill., has been appointed director of safety. He will retain his former title as well.

—o—

Dr. Irving Langmuir, associate director, General Electric Research Laboratory, Schenectady, N. Y., has been elected to honorary membership in the Institute of Metals, London. The institute has only two honorary members at present. One is **Prof. C. A. F. Benedicks,** director, Metallographic Institute, Stockholm, Sweden, and the other is **Dr. A. M. Portevin,** who was professor of metallurgy in the Central School of Arts and Manufactures in Paris before German occupation.

—o—

J. E. Love has become district manager of Wiremold Co. With offices at 802-B, Law and Finance building, Pittsburgh, he will cover western Pennsylvania, Ohio, West Virginia and Kentucky.

—o—

Hugh A. Brightwell has been appointed sales and service representative for Manning, Maxwell & Moore Inc., Bridgeport, Conn., and will represent the products of the company's four Bridgeport divisions in the Tulsa, Okla., district.

—o—

Thomas T. Bakke, formerly with Westinghouse Electric & Mfg. Co.'s engineering and service department in Milwaukee, has been appointed manager of the Milwaukee branch of the company's Manufacturing and Repair Division.

—o—

Bernard F. Nemerguth, heretofore chief test engineer, Ohio Crankshaft Co., Cleveland, has been appointed service manager of the Tocco electrical induction heating and hardening equipment division.

—o—

Albert S. Redway, formerly vice president, Farrel-Birmingham Co., Ansonia, Conn., has been elected vice president, Geometric Tool Co., New Haven, Conn. Since 1938 Mr Redway had been vice president and manager of manufacturing with general charge of production and personnel in the Ansonia and Derby plants of Farrel-Birmingham, and also was responsible for planning and coordinating production in the Buffalo plant.

—o—

Thomas P. Archer has been named a vice president of General Motors Corp., Detroit, in charge of the manufacturing and real estate staffs. He formerly was assistant general manager of the Fisher Body Division of General Motors.

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H. H. Erkelenz, executive engineer and co-ordinator of Harnischfeger Corp., Milwaukee, has been elected a vice president, in addition to his former duties. **H. O. Menck** has also been named a vice president, and retains his former capacity as works manager. **F. Salditt** has been

elected to the board of directors; **W. Heilman,** secretary, and **F. J. Hartman,** assistant secretary.

—o—

Donald B. Foresman, account executive with Sheldon, Morse, Hutchins & Easton Inc., New York advertising and publicity agents, has been elected vice president of that organization.

—o—

Walter I. Buchanan, the past seven years field representative for Monmouth Products Co., the last six months being stationed in Detroit, working with the Motor Transport Division of the Quartermaster Corps, has been promoted to chief service manager and will be located at the company's main office in Cleveland.

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Roy C. Davidson, since 1935 assistant freight traffic manager, Chicago, Rock Island & Pacific railroad, has been appointed freight traffic manager, with headquarters in Chicago. **Leroy J. Olsen** has been named assistant general freight agent, with headquarters in Chicago.

—o—

Milton K. Mahler, Morrow Steel Co., Detroit, has been appointed chairman of the industrial relations committee, Institute of Scrap Iron and Steel Inc., which will handle labor and allied problems of the scrap industry. **Richard V. Bonomo,** Schiavone-Bonomo Corp., Jersey City, N. J., has been named vice chairman of the committee.

—o—

A. L. Golay has been appointed to the refrigeration application engineering and service staff of Kold-Hold Mfg. Co., Lansing, Mich., and will cover the mid-west territory, comprising Missouri, Iowa, Kansas, Nebraska and part of Minnesota. For the present he will be located in Lansing.

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Garnett G. Rush has been named purchasing agent, Wall Wire Products Co., Plymouth, Mich.

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A. Dale Mitchell, formerly associated with Barrow, Wade, Guthrie & Co., has been named controller, Waterbury Farrel Foundry & Machine Co., Waterbury, Conn., succeeding **William M. Birs,** former assistant treasurer, who resigned last December.

—o—

Thomas C. Finnell, since 1931 application engineer in the New York district, Westinghouse Electric & Mfg. Co., has been named manager of the industrial department, eastern district. He succeeds **C. W. Miller,** who has become manager of the application department of Westinghouse Radio Division at Baltimore. Mr. Finnell will supervise the supply of electrical equipment to war industries throughout New York state and northern New Jersey.

—o—

Herman C. Teetor has been granted leave of absence from Perfect Circle Co., Hagerstown, Ind., to take up his duties as a lieutenant in the United States Naval Reserve. Associated with the company 16 years he has served in merchandising and advertising capacities, management of the consigned stock and premium sales departments, and liaison work between the engineering and sales divisions.

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Frederick V. Geier, president, Cincinnati Milling Machine Co., Cincinnati, has been named chairman of the local committee on organization for the Committee for Economic Development, a national industrial group engaged on plans for postwar employment.

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A. N. Morton has been appointed production manager of Mack Mfg. Corp.'s three plants. He formerly was factory manager of the Plainfield, N. J., plant. He succeeds **Charles T. Ruhf,** who had been operating vice president in charge of the factories before assuming the presidency.

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Erle V. Daveler has been elected a vice president, American Zinc, Lead & Smelting Co., St. Louis. He was formerly vice president, Utah Copper Co.

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W. R. Gerow, assistant manager, Cleveland Equipment Works, General Electric Co., Cleveland, has been made general manager of that plant and of the Nottingham Works.

—o—

W. P. Voth has been elected president, Akron Standard Mold Co., Akron, O., succeeding the late Andrew J. Fleiter, **F. L. Behra** is vice president, and **J. I. Barnby,** secretary-treasurer.

—o—

J. D. Holmes has been appointed manager of the newly organized Feedwater Treating Division, Magnus Chemical Co. Inc., Garwood, N. J. Mr. Holmes has had a wide range of experience in the treating of feedwater, having covered all types of stationary plants, railroads and steamship lines throughout the United States, Canada and the West Indies.

—o—

D. H. O'Brien, vice president, Graybar Electric Co. Inc., New York, has resigned after 26 years of service to devote himself entirely to his new work in the United States Signal Corps. He will head the new Field Service Division of that branch of the Army, and will maintain headquarters in the Pentagon building, Washington.

—o—

William S. Newell, president Todd-Bath Iron Shipbuilding Corp. and Bath Iron Works, Bath, Me., has been elected a director, Mack Trucks Inc., Long Island City, N. Y.

—o—

Bruno Sachs, formerly technical director, Johnson Bronze Co., New Castle, Pa., has become production manager, Dillon Corp., Irvington, N. J.

—o—

William M. Stabler has been promoted to service manager, Liquid Cooled Engine Division of Aviation Corp., Toledo, O. Mr. Stabler joined Aviation Corp.'s Lycoming Engine Division at Williamsport, Pa., in 1928, and for five years was the division's special service representative. At one time he was manager of Lycoming Airport, later was executive pilot for the company and then supervisor of experimental departments.

—o—

Oscar N. Lindahl, vice president, Carnegie-Illinois Steel Corp., Pittsburgh, has been appointed a member of the committee on postwar controllership problems, Controllers Institute of America, New York, and also of its committee on co-operation with the treasury department. Mr. Lindahl is a past president of the institute.

George Geekie, controller, T. E. Conklin Brass & Copper Co., New York, has been elected to active membership in the Controllers Institute of America.

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Frank Rising, general manager, Automotive Parts and Equipment Manufacturers Association Inc., Detroit, announces election of the following new officers at the annual board of directors meeting in Detroit March 16: President, **C. C. Carlton,** vice president and secretary, Motor Wheel Corp.; executive vice president, **D. O. Thomas,** vice president, Bendix Aviation Corp.; vice president for aviation, **Fred C. Crawford,** president, Thompson Products Inc.; secretary, **Hugh H. C. Weed,** vice president and general manager, Carter Carburetor Corp.; treasurer, **W. C. Williams Jr.,** vice president, General Motors Corp.

In addition to the officers, the board includes **John Airey,** president, King-Seeley Corp.; **J. O. Eaton,** chairman of the board, Eaton Mfg. Co.; **Byron A. Fay,** vice president, Electric Auto-Lite Co.; **Neil A. Moore,** vice president and general manager, Sealed Power Corp.; **James L. Myers,** executive vice president, Cleveland Graphite Bronze Co.; **W. D. Robinson,** vice president and assistant general manager, Briggs Mfg. Co.; **W. F. Rockwell,** chairman, Timken-De-

troit Axle Co.; **F. A. Ross,** vice president, Stewart-Warner Corp.

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George F. Campbell, vice president, Old Ben Coal Corp., Chicago, has accepted the chairmanship of the 1943 coal mine war conference of the American Mining Congress which has been scheduled for Cincinnati, May 17-18.

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R. L. Beattie, vice president and general manager, International Nickel Co. of Canada Ltd., and **J. C. Traphagen,** president, Bank of New York, have been elected directors of the Canadian company.

—o—

William P. Headden has been named supervisor, fuels and lubricants section, Engineering Division, Esso Marketers, New York. He has been active in the Engineering Division of the company for 14 years. **Charles W. Bohmer Jr.** has been made assistant supervisor, fuels and lubricants section.

—o—

Allan Lintern has been elected president and general manager, Lintern Corp., Berea, O. **J. B. Lintern** has been elected vice president; **William Alfred Lintern,** vice president and secretary, and **R. G. Kollar,** purchasing agent.

—o—

Robert H. Morse, Jr., assistant sales manager, has been appointed general sales manager, Fairbanks, Morse & Co., Chicago. Associated with the company and its subsidiaries since 1916, he has served in the manufacturing and sales divisions, successively becoming manager of the Cincinnati, Dallas and Boston branches, and the Stoker Division.

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George E. McMahon, factory superintendent of the Bellwood and Hillside, Ill., plants, Vulcan Stamping & Mfg. Co., Chicago, has been elected vice president in charge of manufacturing.

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Liquid Carbonic Corp. has increased directors from nine to eleven, and elected to the new posts **A. F. Wall,** general manager of the company's oxyacetylene activities, which operates under the name of Wall Chemicals Division, Detroit, and **H. C. Wright,** president, Chicago Flexible Shaft Co., Chicago.

OBITUARIES . . .

Arthur Livingstone Kimball, 57, research physicist and consulting engineer, General Electric Co., Schenectady, N. Y., died in that city, March 20. He entered the company's research laboratories in 1918, specializing in problems of vibration and elasticity and later pioneered in the application of photographic measurements to the study of stresses in rotating machines.

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Carl M. Peterson, 64, one of the founders of Star Electric Motor Co., Arlington, N. J., died in that city, March 21.

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Charles Henry Earp, 85, for more than 25 years in the service of United States Steel Corp. subsidiaries until his retirement in 1929, died in New York, March 20. During his association with the Steel corporation he traveled throughout the Mediterranean countries and maintained headquarters in London. Later he supervised warehousing activities of the corporation along the west coast of South Africa, with headquarters at Valparaiso, Chile.

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Christian P. Fonss, 48, since 1930 a partner, Olsen & Knutsen Iron Works, Port Richmond, Staten Island, died March 21 in Staten Island.

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Charles C. Foster, 76, secretary, Singer Mfg. Co., New York, for 40 years, died in that city, March 22.

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Leslie Harold Dodd, 54, district engineer in St. Louis for American Institute of Steel Construction, died March 14, at his home in Maplewood, Mo. Before going to St. Louis he was for eight years the institute's district engineer at Dallas, Tex.

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Christian H. Stoelting, 78, president, C. H. Stoelting Co., Chicago, died in that city, March 18.

—o—

George E. White, 77, who retired in 1937 as assistant freight traffic manager, Chicago, Rock Island & Pacific railroad, Chicago, died March 15, in Wilmette, Ill.

—o—

James H. Doyle, 75, who retired in 1936 as district superintendent, American Can Co., Chicago, died March 18, in that city. He was one of the original group of canmakers who joined American Can when it was founded.

—o—

John S. Jonsson, 60, chief structural engineer, Graham, Anderson, Probst & White, Chicago, engineering architects, died March 14, in Hastings, Nebr., where he was supervising construction of a naval depot.

—o—

Louis C. Madeira III, 51, former executive director, Anthracite Institute, New York, died in that city, recently. He entered the coal business in his father's firm of Madeira Hill & Co., Philadelphia, becoming a vice president. He resigned in 1934 to join the Anthracite Institute.

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William H. Appleton Holmes, 60, treasurer, D. Saunders Sons Inc., Yonkers, N. Y., died in that city, March 6.

—o—

Donald C. Barrick, 59, a specialist for over 36 years in the construction and installation of street lighting standards, died March 9, in Cleveland. He had been associated with Union Metal Mfg. Co., Canton, O., almost continuously since he and his father founded the company in 1906. He served a number of years as secretary-treasurer and was also a member of its sales staff.

—o—

Andrew H. Lance, 80, former vice president and treasurer, Simmons Co., Kenosha, Wis., died in that city, March 13.

—o—

Albert B. Hostetler, 68, who retired July 1, 1940, as auditor of the Rock Falls, Ill., works of International Harvester Co., died in Sterling, Ill., March 9.

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William P. Yooss, 51, vice president, Federal-Huber Co., Chicago, died March 4, in Orlando, Fla. Although he had made his home in Orlando the past eight years, he had retained his business connection.

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Joseph V. Wedgwood, for 15 years sales manager of the Neenah, Wis., plant of Manhattan Rubber Mfg. Division, Raybestos-Manhattan Inc., Passaic, N. J., died in Neenah, March 6.

—o—

John W. Fogg, 78, vice president and general manager, MacLean-Fogg Lock Nut Co., Chicago, died March 5.

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Dr. Edward Curran, 70, one of the perfecters of the altimeter, died in Alhambra, Calif., March 6. Dr. Curran spent the greater part of the last 50 years inventing mechanical devices, on many of which he held patents.

—o—

Herbert G. Beede, 73, president, Pantex Pressing Machine Inc., Pawtucket, R. I., died in that city, March 6. Mr. Beede held many patents on textile machinery and on pressing and laundry machine equipment.

OPA Issues New Regulation Covering Ferrous Forgings

OPA has issued regulation No. 351, placing ferrous forgings under separate coverage.

The new regulation, effective March 31, covers all iron and steel items produced by power hammers, presses or forging machines, including those on which have been performed trimming, coining, testing, inspecting, heat treating, welding, machining, plating or other surface coating.

Current prices, established under price order No. 136, will remain in effect, based on the Oct. 1, 1941, price list. In addition to freezing list prices as of that date, the order provides that the ceiling for all ferrous forgings sold without list prices between January and Oct. 1, 1941, shall be prices of such items on the last contract in that period.

The following are not covered by the new regulation: Stampings, chains, hand tools, expendable tools, marine hardware, products controlled by schedule No. 6, forgings which are component of machine or spare parts when sold by a manufacturer already covered by other regulations; and forgings produced under developmental and secret contracts.

Curtails Use of Copper and Steel in Busway, Bus Duct

WPB has issued order L-253, calling for a saving of 4,500,000 pounds of copper and 4250 tons of steel over previous use in manufacturing busway and bus duct. The order covers only the common types of prefabricated plug-in and feeder type busways and excludes those using rolling trolleys or step-type.

Close Check To Be Made of Compliance with CMP Rules

Plans have been made by WPB for checking 5000 to 10,000 users of controlled materials to study compliance with present regulations. The survey is to be extended later to cover all companies operating under the Controlled Materials Plan, including prime and secondary producers of both "A" and "B" products.

WPB Places Ferrocolumbium Under Full Allocation

WPB has placed ferrocolumbium under complete allocation with the issuance of general preference order M-296, designed to prevent its use where other materials can be substituted. Applications for use must be filed on PD-391 or PD-707.

Revises Secondary and Scrap Aluminum Price Schedule

Maximum prices on aluminum scrap and secondary aluminum ingot have been revised to permit secondary smelters in certain instances to pay baling and briqueting premiums on three grades of plant scrap and to add ½-cent per pound to maximums for ingot from plant scrap.

Changes effected in amendment No. 6 to price schedule No. 2 for the purpose of increasing the supply of aluminum aircraft alloys are effective March 31. The amendment enables secondary smelters, acting under specific WPB authorization, to pay the same prices as offered by primary producers.

WPB Orders More Extensive Use of Scrap Turnings

Steel mills have been ordered by WPB to make more extensive use of scrap turnings in order to conserve critical alloys. This action was taken in an amendment to order M-21-a.

Order requires each person melting alloy steel, including castings, to use alloy steel turnings in an amount not less than 4 per cent of the total weight of alloy steel ingots and castings produced each month.

A discussion of the problem at the last meeting of the Steel Industry Advisory Committee revealed that use of turnings had increased 30 per cent in February as compared with January. Further substantial increases are expected to result from the order.

A new provision of the order also requires producers of stainless steel castings to use a certain percentage of chrome-bearing scrap.

WPB Relinquishes Control Over Palm Oil Distribution

Control over palm oil has been transferred to the Food Distribution Administration. The new order, Food Distribution order No. 38, replaces War Production Board Order M-59.

The re-issued order continues the same restrictions as order M-59 on the processing, delivery and use of palm oil but provides exemption from the restrictions for any person using less than 2000 pounds of palm oil per quarter. The use of palm oil has been limited since April 1, 1942, to the manufacture of tin plate terne plate, steel sheets, steel strip, and black plate and to processes yielding required percentages of glycerine.

SENATE POSTWAR ECONOMIC COMMITTEE MEETS

Here are the Senate Postwar Economic Committee members as they held their organization session in Washington last week. Front row, left to right: Joseph C. O'Mahoney, Wyoming; Alben C. Barkley, Kentucky; Walter F. George, Georgia; Charles L. McNary, Oregon; Arthur Vandenburg, Michigan. Standing, left to right: Robert Taft, Ohio; Claude Pepper, Florida; Scott W. Lucas, Illinois; Warren R. Austin, Vermont, and Carl Hayden, Arizona. For article on postwar planning see page 41

WINDOWS of WASHINGTON

Congressional activities indicate concern about welfare of business and individuals. . . President's "cradle to grave" proposal misinterpreted as a plan of "dreamers" and "idealists"

DESPITE the leisurely approach that Congress so far seems to have made on the subject of postwar planning, as discussed in this department last week, there are definite indications as to certain portions of the overall pattern as they already have taken form or will take form.

"Of one thing you can be certain" says an influential member of the House. "As soon as the war is over, Congress will be practically a unit in eliminating government controls as far as possible. The people of this country will be fed up with many of the curbs they are tolerating in time of war."

He added: "The thing to be guarded against is that the removal of controls must not be so drastic as to threaten disorders in our economy."

Another thing about the seventy-eighth Congress is that it seems to have a better understanding than previous Congresses of what makes the wheels of industry go round. Today more Congressmen—in the course of casual conversations—express their belief that business after the war can best be stimulated through a greater profit incentive.

Urges Consulting Services

The trend also is indicated by S. 356, reintroduced in January by Senator James M. Mead of New York. This bill, prepared in consultation with the Department of Commerce, would direct the Secretary of Commerce to establish "a field consulting service, the personnel of which shall consist of persons experienced and trained in the problems of small business and capable of counseling owners and managers of small business in management and other problems relating to location, manufacturing processes, distribution channels, domestic and foreign markets, sources of merchandise, merchandising, record keeping, cost accounting, personnel and related subjects." Its aim is to set up a staff, somewhat along lines of the county farm agents of the Department of Agriculture, to help and stimulate "small" business and thus make for a healthy economy.

This bill is of especial significance because it reveals a rather radical change in official thinking as to encouragement of small business. The original plan was to encourage business through government loans. As time has gone on, however, a weakness in this method of approach has become recognized. The flaw which has been detected is that such a program of government loans might have the effect, in many cases, of saddling debts upon people not accustomed to handling money—thus inviting bankruptcies and other shocks to the economy. The bill, as now worded, is aimed at helping small manufacturers to stay solvent and keep going. The bill makes no mention about rendering assistance to "big" manufacturers, the theory being that the big manufacturers can take care of themselves.

In casual conversations with Congressmen one senses a feeling that labor's stake in the economy has been magnified to a greater extent than is fair and just. At the same time there are no present signs that Congress will be prepared at any time in the near future to enact any remedial labor legislation. On the other hand, there obviously is a definite belief that the farmer never has been treated intelligently and fairly. All signs are that the farmer will receive more favorable treatment as time goes on. Another subject that keeps bobbing up in conversations with members of Congress, is postwar taxation; the general feeling being that the tax burden must be reduced materially after the war.

One congressman has worked out an intriguing plan by which the tax load would be ameliorated to an appreciable extent. "My point of view", he says, "is that we could do away with taxation to the extent of an amount of money equal to the same percentage of the amount of money previously in circulation as the increase in production in a given period was to total production in the previous year. It is a simple matter of placing a credit on the Treasury books. I think that as we need additional money to transact an increasing volume of busines, we ought not to have to tax the people or to borrow in order to secure this amount of money to be put in circulation through government expenditures. I do *not* feel that, except in unusual cases, this would provide sufficient revenue. It would, however, make all the difference in the world between excessive taxation and the amount of taxation that could readily be borne by business and other portions of the community."

The foregoing discussion, and other discussions that have appeared in this spot in recent issues, should make it clear that while a great deal of study has been devoted to postwar economic planning, that while plans with much merit already have been formulated, still no part of the planning program as yet has been "frozen". These discussions also should suggest that the vast amount of educational work that has been done by industry, together with the particularly fine performance that has been turned in by industry in producing for war, has resulted in increasing the esteem in which private enterprise now is held by our economists in general and by the public at large.

Education of People Necessary

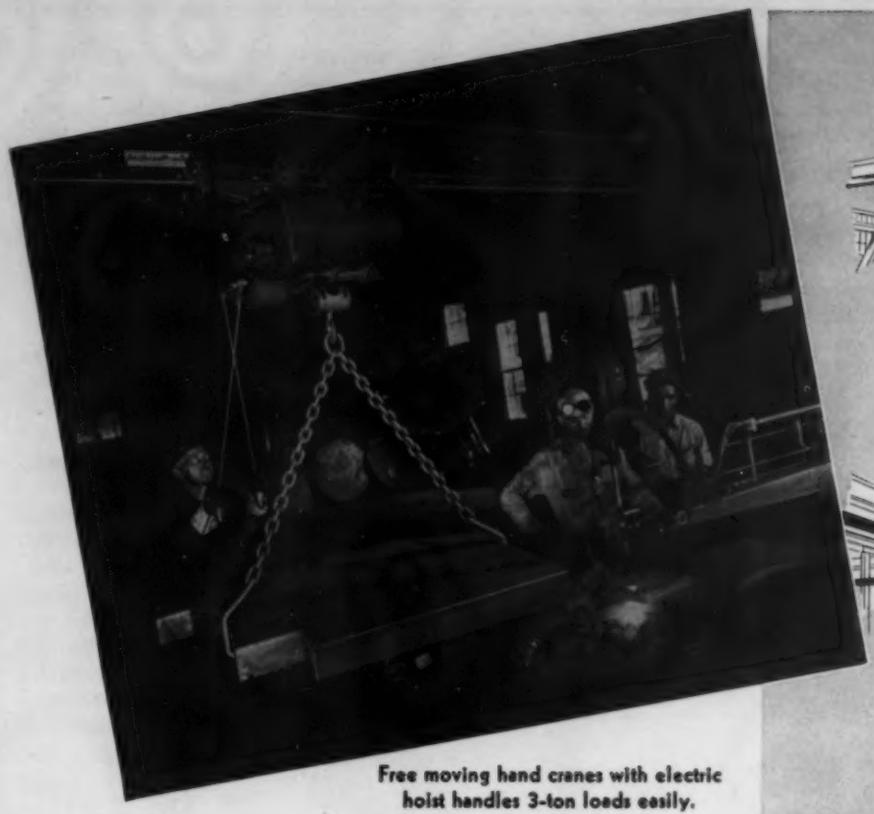
In addition to the postwar planning now being done by individual companies and by community groups all over the country, in order to be ready with manufacturing programs that will create vast employment after the war, it would be extremely helpful if industry could redouble the intensity of its campaign of educating more and more of our people as to what kind of a public policy will be necessary to stimulate business if that objective actually is to be achieved on a large scale after the war.

It is necessary to have more people understand the fact that to function to advantage industry needs, first of all, the assurance that a fair rate of profit may be earned on capital investment and distributed among the investors. It needs a return to the old appreciation of thrift, so that money again will be encouraged to accumulate and, in turn, be lured into investment in the hope of a profit. It requires a better understanding of the fact that when workers demand and obtain unduly high wages

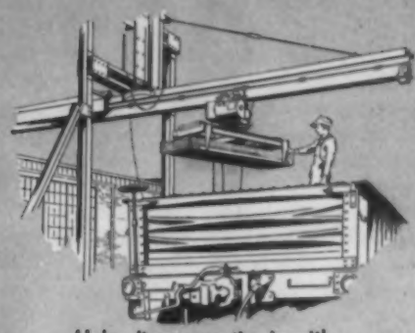
A SPECIAL REPORT TO INDUSTRY

POSTWAR PLANNING

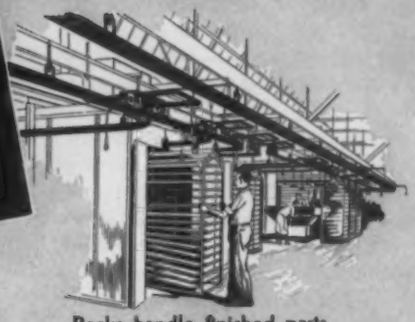
This is the tenth of a series of a detailed study of what is being thought about and accomplished toward making the postwar world a place in which the individual and industry may flourish.



Free moving hand cranes with electric hoist handles 3-ton loads easily.



Unloading crane ties in with plant storage area.



Racks handle finished parts through drying ovens.

FOR THE DURATION AND LONG AFTERWARDS

American MonoRail Equipment offers versatile application without costly adjustment or lengthy engineering.

YOU can better your production NOW—later in the post-war period you will have essential equipment available for changes in product or process.

American MonoRail handling equipment is extremely flexible. Standard parts fit quickly and easily into complete systems that solve a wide range of handling problems.

Don't let your handling problems impede your war work. Let our engineers show you how to speed up NOW with an eye on easy, inexpensive adjustment when Victory is ours.

Stripping crane speeds up removal of wire coils.

Crane over storage area moves steel easily.

THE AMERICAN MONORAIL CO.

13102 ATHENS AVENUE ★ CLEVELAND, OHIO

they are slowly but surely killing the goose that lays the golden eggs. It also requires an understanding of the need for industrial management to be free in its use of manpower since when labor dictates to management, inefficiency is more than likely to step in and employment potentialities reduced.

Most observers believe that while Congress has manifested hostility to the activities of the National Resources Planning Board, by lopping off its appropriation for the fiscal year beginning July 1, 1943, actually the administration's plan finally will be adopted in considerable measure. Public works always will be required to some extent, and everybody concerned with the problem agrees that public work should be done by way of an orderly program. Everybody agrees that there must be a high level of employment in civilian industries as we demobilize from war to peace, and that our plane of living must be high. And there is increasing opinion that future tax laws must be shaped so as to encourage rather than discourage profit incentive on industrial investments.

All of these factors are covered thoroughly in plans sponsored by the National Resources Planning Board.

It may be pointed out that when the President on March 10 sent the National Resources Planning Board plan to Congress the story that was released to the newspapers caused them to stress the idea that the plan was aimed at creating "cradle-to-the-grave" security. News representatives got the idea that, under the plan, the declared policy of the federal government after the war should be:

"To underwrite full employment for all employables;

"To guarantee a job for every man released from the armed forces and the war industries at the close of the war, with fair pay and working conditions;

"To guarantee and, when necessary, underwrite: Equal access by all to security, education, health and wholesome housing conditions."

Plan Suggests Utopia

In other words, the story suggested to many practical minds that the administration planners were idealists who envisioned a sort of never-never dream world, a Utopia where all would be well, where the sun would always shine, where the birds would always sing, and where the government would guarantee to protect every man, woman and child against toothache, falling arches and the itch.

It is unfortunate that the story, worded in this way, was announced to the public at a time when propaganda for a fourth term had been launched. It failed to do full justice to the plan, which, as has been revealed in this department in previous issues, actually has a great deal of merit. It is to be hoped that Congress will devote to the plan the careful study it deserves.

Postwar Era Worries Congress

Unwittingly, perhaps, Congress already has been influential in setting up policies that are now in effect and are bound to influence our economic life as we go ahead both in the war as well as in the period of peace. Congressional hearings and debates have revealed a high degree of concern with the welfare of business and individuals in the wartime economy. Congressional reports have criticized the distribution of war contracts and subcontracts and there has been much concern over "ghost towns" and "distressed plants" and "depressed areas". Congressmen have insisted that our economy must be maintained in a state of health so that when our boys return they can go back home and obtain employment. It was this state of mind that led to congressional creation of the Smaller War Plants Corp., with an appropriation out of which loans could be made to smaller plants. The Smaller War Plants Division of the War Production Board, under this setup, has the responsibility for finding work for distressed plants and distressed areas. Smaller War Plants Division now has a policy of holding meetings in its regional offices all over the country. At each meeting all government procurement agencies are represented. The group goes over a list of the distressed plants in its area and is charged with the responsibility for placing orders where a distressed condition is to be remedied. Out of this type of activity have come some satisfactory results. The bad situation in the New York City area has been much improved. The depressed furniture industry at Grand Rapids, Mich., now is being helped. Programs now are underway at Atlanta, Chicago and in other regional areas.

This type of activity is of the very essence of postwar planning, because it is leading to creation of conversion machinery during the war. It is establishing organizations which will ease the job of reconversion after the war, for the problem then will be better understood as a result of the experience now being gained.

There is every reason to believe that our present experience in conversion from production of one type of goods to another will be further intensified even while we still are at war.

That is because of the enormous scale on which we are producing war materiel and on which we will shortly be producing even more. It is no secret that within a period of months more production lines will have to be slowed down or halted for lack of ability to absorb their output. Then will come the need for reconverting back to civilian production—a process that should manifest itself more and more as our needs for war are more than met. Out of this experience should come some fairly good, practical formulas for the overall reconversion job that will come later.

While Congress, the all-important factor in government as far as postwar planning is concerned, appears to be floundering around to a certain degree, it will be seen from the above that we actually, from the standpoint of government, have made a considerable amount of progress already in creating machinery and in establishing policies that have to do with the postwar economy. In this respect we are far in advance of our position in 1919 when we entered the period of peace without any semblance of national postwar planning.

Department of Commerce Active

In passing, it should be understood by business men that various government agencies that have provided and continue to provide money to finance war plants all operate under the authority of the Department of Commerce. This department is studying the postwar problems of disposing of these manufacturing properties. It is too early to discuss this program in detail. However, the Department of Commerce, under Secretary Jesse Jones, and Under Secretary Wayne Taylor, envisions a broad plan by which these plants will be acquired by private industry to the largest extent possible. The approach in this thinking is that government should not, as a general rule, engage in competitive business.

In concluding this series of discussions on postwar planning, and at the risk of repetition, emphasis is placed upon the need for an adequate postwar planning job by business and industry, both by individual companies and by local groups and communities. Industry and business should be ready with complete manufacturing and servicing programs of all kinds to be placed in operation whenever circumstances make that possible. These plans should be frozen *now* that they may be applied even prior to the war's end if that becomes possible.

The plans perhaps should be more on the bold than the conservative side. Our people are going to want a lot of housing, a lot of automobiles, a lot of airplanes, a lot of railroad equipment, a lot of rebuilding and a lot of everything else when the emergency is over. They are accumulating a lot of money with which to buy these goods. Employment

is bound to be at a high rate—for the experience in converting to war resulted in the creation of a going organization to obtain production at higher and higher rates. That all combines to forecast a high level of public purchasing power after the war.

Any manufacturer or business man who has questions to ask about postwar planning, incidentally, can get a lot of assistance by writing to the Committee for Economic Development, with headquarters in the Commerce Building, Washington. This is the committee of business men described in this department in STEEL of Feb. 1 and 8.

As previously indicated in this series, chief angles of postwar economic policy still to take on a definite pattern are: Taxation, the extent to which labor will be encouraged or permitted to dominate industrial management, the relationship between wages and profits, the extent to which low-priced imported goods—under our "good neighbor" policy in international affairs—will be allowed to compete against domestic goods, the need for an intelligent control of government spending, and the social security system.

Necessary Adjustments Expected To Be Completed by July 1

PROBLEMS connected with putting the Controlled Materials Plan into operation are being ironed out as rapidly as possible, and necessary adjustments should be made by July 1, when the plan is scheduled to go into full effect.

J. A. Krug, program vice chairman, made this statement in commenting on a letter sent to WPB officials by the Automotive Council for War Production (STEEL, March 22, *p.* 39).

No basic changes have been made in CMP, Mr. Krug said, and any adjustments necessary can be made within framework of the plan as constituted.

"Because difficulties and a certain amount of confusion were expected," Mr. Krug said, "we explained when the plan was first announced last November that a transitional procedure would be used during the second quarter of 1943, before CMP goes into full operation on July 1. This transitional procedure, including authorizations for companies under the Production Requirements Plan to obtain materials in the second quarter, will assure the flow of materials to war plants in the second quarter.

"The job of distributing allotments of controlled materials through 13 claimant agencies will not be perfect the first time. There will be cases in the first go-around where allotments do not exactly match approved production schedules. Producers have been advised to make up differences if possible through use of inventory. Where an actual stoppage of production might be threatened, they can obtain relief by application to the claimant agency. It will be necessary to readjust some production schedules as well as the preliminary allotments, but all of this is to be expected in putting production on a strict allotment basis.

"Harold Boeschenstein, who has been in charge of the administration of the Controlled Materials Plan since it was first announced, has been working steadily with his staff to eliminate difficulties in CMP which show up only when it actually begins to operate. We have no evidence to indicate that these difficulties are causing any actual interference with war production, and we have no reason to believe that they will. We ask industry to show a reasonable amount of patience during the period of transi-

Henry J. Kaiser presents the President with a model of the dual-purpose aircraft carrier soon to be launched. Standing, left to right: Rear Admiral Howard L. Vickery, Maritime Commission; Mr. Kaiser; Artemus L. Gates, assistant secretary of the Navy for Air; Rear Admiral Emory Land, chairman, Maritime Commission. Below, Mr. Kaiser "snaps" Frederick Riebel, new vice president, Brewster Aeronautical Corp., Johnsville, Pa., of which Mr. Kaiser was named chairman

tion to a plan whose principles have been endorsed almost unanimously, both by business men and all of the Government agencies involved."

WPB Warns Manufacturers Not To Duplicate Orders

Serious impairment of the scheduled flow of materials under the Controlled Materials Plan is threatened by placing more than one order for aluminum, copper, or steel allotted, WPB officials warn.

To halt this practice before it assumes dangerous proportions, WPB has issued an interpretation of CMP regulation No. 1 which makes it clear that duplication of orders for allotted materials is in violation of the law and may subject manufacturers to severe penalties under the criminal code.

Harold Boeschenstein, director, WPB Controlled Materials Division, said that in some cases duplicate orders are being placed on the theory that delivery will thus be made more certain. Even though a manufacturer who places more than one order for the same material does so with the intention of cancelling the excess before delivery, the resulting confusion in mill schedules threatens not only his own supply but that of other war producers as well, he added.

Revocation of Order P-120 To Be Effective April 1

War Production Board has announced that order P-120 will be revoked April 1 to prevent confusion with GMP regulation No. 5 which goes into effect on that date. Order P-120 assigned preference ratings for the acquisition of necessary repair and maintenance materials by producers of aluminum and magnesium.

CMP regulation No. 5 provides a method for acquisition of maintenance, repair and operating materials by aluminum and magnesium producers, as well as by manufacturers of other products.

Seventy Per Cent of DPC Plant Projects Already in Operation

ONE THOUSAND and twenty-two of the 1479 plant projects owned by the Defense Plant Corp., RFC subsidiary, have come into actual operation, Jesse Jones, Secretary of Commerce, announced last week. Eight hundred of these were started after Pearl Harbor.

Total commitments approved by DPC (including projects subsequently cancelled or deferred) is $9,175,190,258.10. The $2,657,112,000 DPC will have invested in aircraft and aircraft accessories plants will exceed by about ten times the entire assets of all aircraft manufacturers before the war and its total commitments for all military purposes amount to one-seventh of the combined total assets of all the 90,000-odd manufacturing and mining companies in the United States in 1939. Total square feet of airplane plant space alone—35,000,000—would cover 700 city blocks 250 x 200 feet, or one solid city block 200 feet wide and 33 miles long.

Largest DPC commitment for facilities now in operation is for an aircraft engine plant costing $173,357,236. The smallest is for machinery costing $14,251.50 at a plant making jewel bearings. The 1022 plants are located in 43 states and are operated by 708 different companies.

Total cost to DPC of constructing and equipping these 1022 plant projects is $4,317,751,000. This includes facilities at 51 plants costing $483,483,000 making airplanes, including bombers, fighters, cargo planes, trainer planes, and gliders; 344 plants costing $1,965,351,000 making aircraft engines and other aircraft parts; 70 plants costing $337,450,000 for ordnance; 54 for $47,995,000 making radio and communication equipment; 161 for $81,559,000 making machine tools; 42 for $143,822,000 building ships, engines, and parts; 57 for $141,283,000 making steel and pig iron; 43 for $518,804,000 producing aluminum metal and fabrication; 24 for $307,728,000 producing magnesium metal and fabrication; 22 for $29,722,000 producing other metals and minerals; 6 for $95,785,000 making synthetic rubber; 4 for $70,416,000 making butadiene and styrene, bases for synthetic rubber; 80 for $55,983,000 producing other war materials and supplies; and 64 for $38,370,000 for the acquisition of flying schools.

Other types of facilities are also being financed, such as pipelines, barges, and cars for the transportation of petroleum to relieve the shortage in the East. Commitments for six oil pipelines aggregate $153,586,000 for the building of approximately 2832 miles of pipeline, the longest line being the $95,000,000 24-inch line from Longview, Texas, to the Eastern seaboard, with daily capacity of 300,000 barrels of crude oil or 350,000 barrels of petroleum products. The first 530 miles of this line, terminating at Norris City, Ill., is now in operation, and the remaining 857 miles will be completed by late summer. Recently DPC agreed to build a second line to cost about $44,000,000 from Baytown, Tex., to Seymour, Ind., with daily capacity of about 235,000 barrels of gasoline and light petroleum products. Commitments totaling $87,035,000 have also been approved for movement of oil barges and rail.

Commitments totaling $1,818,057,000 have been made to approximately 340 machine tool manufacturers to purchase tools in case they are not purchased by others. These orders are guarantees to the machine tool builder, many of whom are small, of prompt markets and prices for his product until firm orders are placed by private enterprise or government agencies. From this pool, tools costing $839,312,844 have gone directly from tool manufacturers to ultimate users, and DPC's commitments to purchase have been reduced accordingly. In addition, $385,084,000 has been approved, of which $150,000,000 was for a small arms program (subsequently canceled); $122,812,000 for machinery and equipment, $20,000,000 of which went for machinery in the plants of 700 subcontractors; $43,388,000 for railroads, bus, and other transportation; the balance for housing and other purposes. The housing facilities will provide temporary quarters for between 25,000 and 30,000 construction workers, and 5500 residences for plant-operating employes.

OPA Plans Revocation of Construction Price Order

Most parts of the construction industry not already exempt from price control soon will be removed from regulation, Price Administrator Prentiss M. Brown has announced. However, repair and maintenance services which are a factor in civilian rents will remain under control.

All general contracting activity and many types of subcontracting for jobs on new dwellings and factories as well as many of the services connected with the construction of a new building will be formally excluded from price regulation.

The administrator stated the removal from price control would be accomplished through revocation of maximum price regulation No. 251 (construction services and sales of building and industrial equipment and materials on an installed or erected basis).

Examples of construction work which will remain under control are as follows: Repair services, including plumbing and the repair and maintenance of heating

plants; sheet metal work; sale of goods, such as roofing, flooring and siding, on an installed basis when such materials are necessary for the maintenance of existing structures; sale of building materials on an installed basis where the items are sold on a unit basis. Materials such as pipe and fencing, and mechanical equipment such as water-heaters and furnaces, when sold on an installed unit basis, remain under control.

Price for materials purchased by the industry will also remain subject to applicable price regulations.

Highway Construction Authorization Modified

To conserve manpower, materials and machinery, WPB has withdrawn a blanket authorization which had permitted road departments to begin highway construction jobs provided no critical materials which had been acquired after May 6, 1942, were used.

The authorization, which in effect gave road departments the right to build any roads where no priority assistance was required was revoked so that equipment and materials tied up on some of these jobs might be diverted to the construction of important military and access highways.

Simultaneously, WPB delegated to regional directors the authority to permit the start of highway construction jobs costing less than $100,000 where federal funds are not required and where no priority assistance is needed. Regional directors of WPB will exercise this authority after consultation with district engineers of the Public Roads Administration of the Federal Works Agency.

Since highway construction jobs costing more than $100,000 must go to WPB for approval by the Facility Review Committee, these applications will be processed in Washington by the Governmental Division of WPB. Similarly, roads requiring federal funds must go to Washington for certification of their essentiality, so these applications also will be processed in Washington.

This action delegating authority to the field to permit the beginning of highway construction is in line with the general decentralization policy of WPB. Authority to permit the beginning of residential, agricultural, and many types of commercial construction, costing less than $10,000, was placed in regional offices March 8.

Regional directors are empowered also to authorize the beginning of highway construction costing less than $10,000 where priority assistance is required.

Construction Volume Falls 14 Per Cent in January

Total volume of construction in the United States declined 14 per cent from December to January as the downward trend continued for the fifth successive month. It is estimated that about 80 per cent of this volume was for war purposes, as compared with about 65 per cent for January, 1942.

January volume of $783,500,000 represents a 46 per cent drop from August, 1942, the peak month of last year, when construction reached a total of $1,468,000,000. Construction in December, 1942, totaled $912,000,000.

War housing and community facilities construction declined 9 per cent from December.

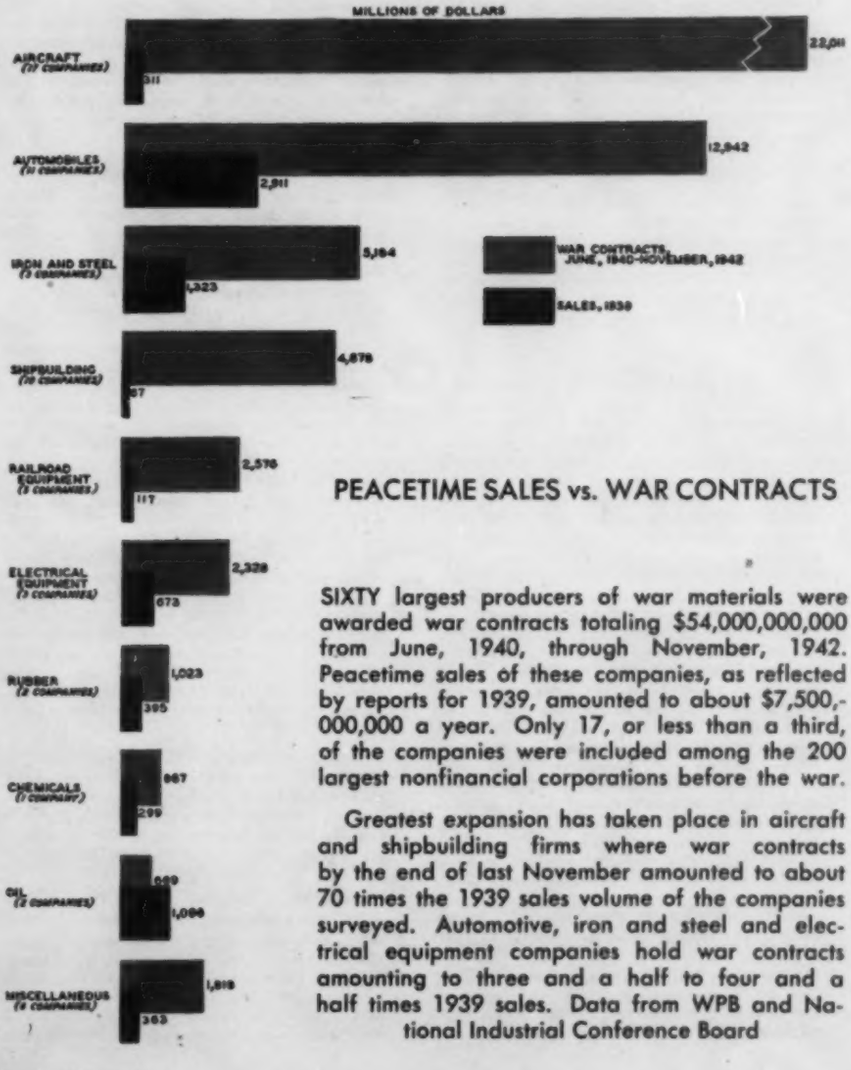
Government-financed factory expansion, including construction volume and machinery and equipment deliveries combined, showed a 10 per cent decline in January.

Machinery and equipment deliveries in February remained at approximately the January level with a probable increase in March.

Pilot Plant To Refine Brazilian Nickel Ore

American Smelting & Refining Co., New York, revealed last week that it will construct a pilot plant at Perth Amboy, N. J., to refine nickel from ore mined from the properties of Companhia Niquel Tocantins in the state of Goyaz, Brazil. If conditions permit, a commercial plant will be constructed in Brazil in 1944. The ore also contains cobalt in commercial amounts and extraction of this metal probably will begin in advance of the nickel operation. American Smelting recently obtained a 50 per cent ownership in the Brazilian company.

William M. Jeffers, national rubber director, and president, Union Pacific railroad, said in New York recently that he "assumed" that railroad travel would be rationed in the near future. He added in making this remark that he spoke as a railroad man and not as a rubber administrator.



PEACETIME SALES vs. WAR CONTRACTS

SIXTY largest producers of war materials were awarded war contracts totaling $54,000,000,000 from June, 1940, through November, 1942. Peacetime sales of these companies, as reflected by reports for 1939, amounted to about $7,500,000,000 a year. Only 17, or less than a third, of the companies were included among the 200 largest nonfinancial corporations before the war.

Greatest expansion has taken place in aircraft and shipbuilding firms where war contracts by the end of last November amounted to about 70 times the 1939 sales volume of the companies surveyed. Automotive, iron and steel and electrical equipment companies hold war contracts amounting to three and a half to four and a half times 1939 sales. Data from WPB and National Industrial Conference Board

PRIORITIES–ALLOCATIONS–PRICES

Weekly summary of orders and regulations issued by WPB and OPA, supplementary to Priorities-Allocations-Prices Guide as published in Section II of STEEL, Dec. 14, 1942

CMP REGULATIONS

No. 5A: MRO Supplies for Governmental Agencies and Institutions, issued March 19. Provides governmental agencies and private institutions such as schools and colleges, churches, hospitals, libraries and welfare establishments with necessary procedure for obtaining maintenance, repair and operating supplies after March 31. Assigns an allotment symbol, MRO-5A, and preference ratings of AA-1 for any activity or service listed in Schedule I, AA-2X for those listed in Schedule II, and A-10 for activities and services not listed in either schedule. Any agency or institution covered by regulation 5A may obtain MRO supplies in such quantities as are available from warehouses or distributors under CMP regulation No. 4, or at retail without preference ratings or allotments, without using the procedure provided in CMP regulation 5A. Exempts following services from provisions of the regulation: gas, light, power, water and central heating, and communications. Forbids any agency or institution to which a rating for MRO supplies is extended on form PD-408 from using during the quarter for which that rating is assigned any rating provided in regulation 5A. Permits the agency or institution, however, to place an authorized controlled material order for the amount of controlled materials rated on its PD-408 in the manner prescribed in regulation 5A, if the supplies are needed in connection with any of the activities listed in Schedules I and II.

L ORDERS

L-53-b (Amendment): **Repair Parts for Track-Laying Tractors, Equipment,** effective March 20. Establishes control over distribution by limiting percentage of production of critical parts that may be shipped to each of five classifications as follows: military, not more than 40 per cent; war projects, not less than 20 per cent; essential civilian operations, not less than 20 per cent; export, not less than 15 per cent; miscellaneous, for sales to persons or for purposes other than those covered by the first four classifications, 5 per cent. Percentages are on basis of number of units produced each month. Urgency need for items of parts falling in the miscellaneous group must be established by certification to WPB.

L-77 (Amendment): **Metal Windows,** effective March 19. Removes restrictions on sale and delivery of completely fabricated metal windows in distributors' and manufacturers' inventories. Permits production on preference rating of AA-3 or higher. Permits manufacture without rating of metal storm windows from material partially fabricated prior to April 3, 1943. Eliminates provision that deliveries of material for manufacture of windows can only be made under PRP.

L-157 (Amendment): **Hand Tool Simplification,** effective April 15. Permits only the forge type of finish for forged axes, hatchets, adzes, broad axes and light hammers. Eliminates handle specifications, permitting these tools to be supplied with or without handles. Reduces the number of items permitted to be manufactured, except number of different forged axe items which may be made to fill orders for export under a license issued by the Board of Economic Warfare or to fill an order of a Lend-Lease government.

L-138 (Amendment): **Automotive Replacement Parts,** effective March 11. Requires production to be scheduled as if orders bore rating of AA-2X. Deliveries may be made without regard to orders bearing rating of AA-3 or lower. Limits production to parts listed in order. Prohibits production on and after April 1 at a rate which will make dollar cost value of inventory of finished replacement parts greater at the end of any quarter of 1943 than it was on April 1, 1943. Allows producers 60-day period following end of each quarter within which production may be increased or decreased to bring inventory to permitted level.

L-211 (Schedule 8): National Emergency Specifications for Steel Products, issued March 22. Establishes standard specifications for carbon steel plates. Provides that no person shall produce or deliver on a government order any carbon steel plate not conforming ot a specification included on List 1 or List 2 of the schedule. Production or delivery for other orders must conform to specifications included on List 1. Exempts from restrictions plates which were produced or fabricated prior to March 22, or plates so processed prior to that date that conformance to the specifications would be impracticable.

M ORDERS

M-1-d (Amendment): **Aluminum Scrap,** effective March 16. Requires all persons generating 500 pounds or more of plant scrap in any one month to separate it by form and alloy content. Permits shipment of segregated plant scrap to approved smelters or dealers, provided the amount of any one alloy shipped in any one month does not exceed 10 tons. Expressly makes dealers responsible for carrying out the segregation program and empowers the director of the Aluminum and Magnesium Division to issue directives requiring the delivery of certain alloys to specific persons. Transfers to the Director of the Division the responsibility for authorizing toll agreements.

M-11-a (Amendment): **Zinc,** effective retroactively to Jan. 1, 1943. Relieves consumers of zinc oxide of the necessity of furnishing written statements to suppliers certifying that receipt of any further shipment will not increase his inventory of zinc oxide in excess of a necessary minimum working supply.

P ORDERS

P-56 (Amendment): **Mines and Smelters,** effective March 17. Sets up simplified procedure governing purchases and deliveries of mining machinery, equipment and supplies for account of producers in all branches of the mining industry. Provides that WPB will assign serial number to each mine that is engaged in essential war production. Outstanding serial numbers will remain in effect until further notice. Serial numbered producers must submit requirements for maintenance, operating and repair supplies on appropriate forms of PD-400 series, for new machinery and other capital equipment on written applications describing equipment and reasons why it is essential for proper operation of mine or plant. Receipts and inventories of producers must be restricted to an amount not greater than minimum necessary to sustain current level of operations. Ratio of inventory to volume of production must not exceed ratio of average inventory to average production for years 1938-39-40. Prohibits disposal by resale of material or equipment obtained under P-56 except (1) to another producer holding a serial number or (2) with approval of the Mining Equipment Division. Assigns blanket rating of A-2 to deliveries of MRO supplies for account of producers or mines not holding serial numbers or those who are not specifically provided for in the order. Applications for assignment of serial numbers should be addressed to WPB, Washington; or filed with State Co-ordinator of Mines; or with Regional Technical Adviser, Mining Equipment Division, Regional office of WPB.

PRICE REGULATIONS

General Maximum Price Regulation (Amendment to Supplementary Regulation No. 11), effective March 24. Removes milling, smelting and refining of primary copper, lead and zinc ores from control under General Maximum Price Regulation. Permits enforcement of contracts for these services made before the amendment in accordance with their terms, even though sums collected after the amendment added to those collected before, total more than the amount that could be collected legally under the GMPR.

Supplementary Order No. 39: Wooden Containers, effective March 26. Provides that a license is necessary in order to make sales of containers and services for which maximum prices are established by the following regulations: No. 117, Used Egg Cases and Used Component parts; No. 186, Western Wooden Agricultural Containers; No. 195, Industrial Wooden Boxes; No. 320, Eastern and Central Wooden Agricultural Containers. Automatically grants licenses to all persons selling the commodities or providing the services for which maximum prices are established by the above regulations.

No. 244 (Amendment): **Gray Iron Castings,** effective March 27. Incorporates a definition that will enable sellers of products containing gray iron castings or of castings alone to determine easily whether their products should be priced under the maximum price regulation for gray iron castings or under some other price regulation. Effects a change in the method of pricing pending decisions on applications for price adjustment. Explains more fully procedure for determining maximum prices to be used by new sellers and by sellers who are not producers. The regulations covers sales of gray iron castings by commercial and also by "captive" foundries. Definitely excludes from the term "gray iron castings" those: sold in an assembly with other materials (except bolts, nuts, screws, rivets or other industrial fastenings); purchased from the seller on which the purchaser has performed subsequent processing; sold as another commodity by a regular manufacturer of such other commodity or by a purchaser from such manufacturer; for which maximum prices are established by revised maximum price regulation No. 236 (Heating Boiler Conversion Parts). Other changes made by the amendment include: A provision that a person who seeks an adjustment of his maximum prices or an amendment of the regulation and who is not selling under government contracts or subcontracts may not price his castings at requested prices pending decision on his application unless he first secures consent of OPA; conditions under which new sellers of castings may apply for a method of establishing maximum prices; more precise description of the pricing method for sellers who are not producers; requirement that in applying the pricing method established under paragraph (b) of section 1421.166 each foundry owned and operated by single seller is to be treated as a separate seller.

No. 258 (Amendment): **Ferroalloys,** effective March 24. Provides that sales of domestic chrome ore made to dealers who buy for resale are excepted from price control. Exempts sales to Metals Reserve Co. Resale of chrome ore by dealers to private users continue to be subject to price control.

No. 347: Mica, effective March 26. Establishes maximum prices for domestic ground mica and mica schist, water-washed mica, and micronized mica. Removes the following from price control: scrap mica and crude mica schist. Sellers of ground mica may add ¼-cent a pound to prices at which they made the greatest number of deliveries

of (or offers to deliver) the same grade of mica during March, 1942 to buyers of the same class. Sellers of dry ground mica and ground mica schist may add a charge for bags no greater than cost of the bags. Freight allowance practice must be at least equal to that in effect during March, 1942. Every domestic producer of ground mica and ground mica schist, water-washed mica, micronized mica, fabricated mica produced from sheet mica and build-up mica must file with OPA a copy of his current prices for all classes of buyers, indicating in each instance his maximum price as determined by OPA regulations. Import sales remain subject to maximum prices established by supplementary regulation No. 12 to the General Maximum Price Regulation. Export sales remain subject to maximum export price regulation.

Government May Requisition Stored Steel at New York Port

Owners of 56 carloads of steel in storage at the Port of New York have been notified the metal must be disposed of into war production by April 1, or the government will take the necessary steps to purchase it as scrap, it was announced by Col. C. R. Baxter, director, Redistribution Division, WPB.

All of the steel, 2445 tons, was purchased for export and was stored at the Port of New York pending shipping arrangements. The bulk of it was intended for countries now under Axis control, or for ports to which ship space is not now available.

Every effort has been made, Col. Baxter said, to move the steel in an "as is" condition so that owners could realize the full price. All carloads have been listed for some months with 3500 federal procurement agencies, together with prime and subcontractors, but no purchasers have been found.

If no purchasers are found by April 1, the government will institute requisitioning proceedings.

Lend-Lease Steel Shipments To England on Increase

Information reaching WPB steel experts indicates that there is an increase of lend-lease steel shipments on the East coast to England. This does not apply to Russia and the South American countries.

It is said that shipments to Russia have not been up to expectations, and South American countries are apparently getting only the steel they are sending for.

Some steel for lend-lease on the East coast has been diverted to other purposes, but these diversions have been few and far between owing to the special specifications of some of this lend-lease steel.

Most of the steel going to England, is semifinished.

Specifications for Carbon Steel Plates Reduced to Twenty-Five

STANDARD specifications for carbon steel plates, reducing the number which may be produced from several hundred to approximately 25, have been established by WPB in Schedule 8 to Limitation Order L-211.

A large percentage of the current production of carbon steel plates is in conformance with the provisions of the schedule. However, elimination of special and other nonessential specifications is expected to result in a substantial addition to productive capacity.

Carbon plates are used largely for the production of ships and also for Army equipment, railroad cars, pressure vessels, welded pipe, and boilers. Carbon plate production amounts to about 12 million tons annually.

Schedule was developed by WPB's National Emergency Steel Specifications Technical Advisory Committee which group is composed of representatives of both producing and consuming interests and representatives of the military services. Selection of specifications covering carbon steel plate uses of the armed forces was made by the services involved. Commercial specifications were chosen from those having the widest distribution and use.

The schedule provides that, effective immediately, no person shall produce or deliver on a government order any carbon steel plate which does not conform to a specification included on List 1 or List 2 of the schedule. Production or delivery for other orders must conform to specifications included in List 1.

Carbon steel plates which were produced or fabricated March 22, or plates so processed prior to March 22 that conformance to the specifications would be impracticable, are exempt.

National Emergency specifications for steel products have already been put into effect for concrete reinforcing steel (Schedule 1); steel wheels and tires (Schedule 2); barbed wire, wire fence, (Schedule 3); structural steel shapes (Schedule 4); steel axles and forgings (Schedule 5); mechanical steel tubing (Schedule 6); and rails and track accessories (Schedule 7).

Army, Navy Co-operate To Develop Uniform Standards

Uniform standards for the substitution of materials in aircraft construction are being developed co-operatively by the Army, Navy, and War Production Board. This is being done under the direction of the Operating Committee on Aircraft Materials Conservation of the WPB Aircraft Production Board.

Members of the committee are: Commander J. E. Sullivan, Bureau of Aeronautics, USN, Recorder; Lieutenant O. C. Roehl, Office of Procurement and Material, USNR; R. R. Gridley, Army Air Forces, USA; Staff Colonel Morris G. Kenney, Services of Supply, USA; and Carl R. Stryker, Chief of the Conservation Branch, Aircraft Resources Control Office, WPB.

Under the direction of this committee suggested substitute materials are assigned for trial to Army and Navy airfields. An Army observer is present when a Navy test is made and a Naval representative watches the test at an Army field.

Until the committee was formed, separate conservation directives were issued by each of the armed services and by the WPB, and manufacturers reported their conservation measures to each.

Three-Nation Aluminum Committee Established

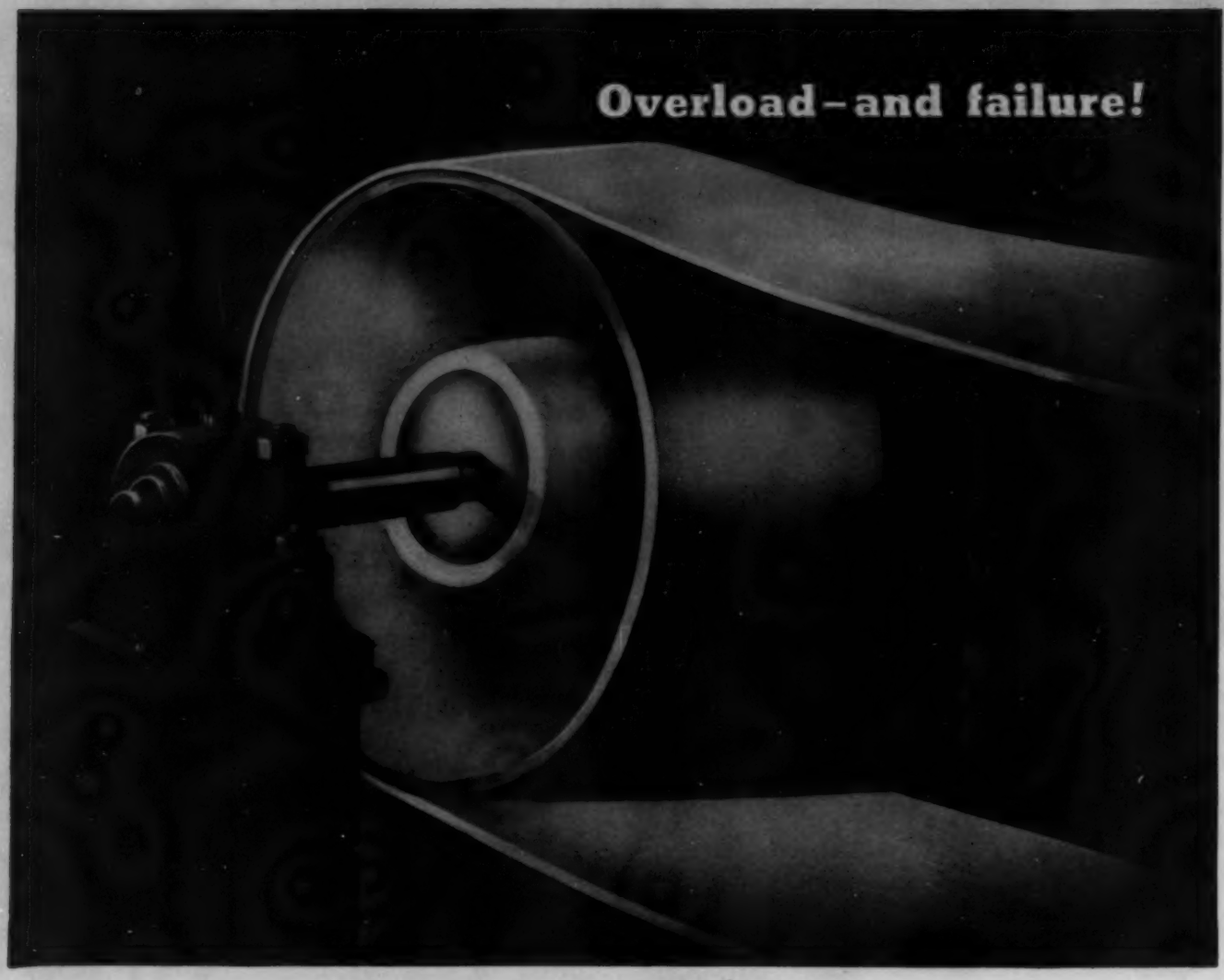
Combined Aluminum Committee, representing the United States, the United Kingdom and Canada has been established to co-ordinate the activities of the three countries in respect to the metal, it was anounced last week.

Charles E. Wilson, WPB executive vice chairman, will serve as committee chairman. The other members are Sir Richard Fairey, director general, British Air Commission, and George C. Bateman, metals controller of Canada.

Committee, which is the fourth of its kind to be appointed, will report its findings and actions to the Combined Production and Resources Board and the Combined Raw Materials Board.

A technical subcommittee consisting of Arthur H. Bunker, director, WPB Aluminum and Magnesium Division, and P. W. Rolleston, director of Materials and Supply, Supply Services, British Air Commission, has been appointed to prepare detailed estimates of 1943 and 1944 production and requirements of the three countries.

First of the combined committees was appointed Dec. 15 to study the steel situation. A committee on copper was appointed Feb. 10, and a committee on rubber, Feb. 16.



Information supplied by an Industrial Publication

Recent tests by a well-known rubber company prove that as little as three pounds extra tension on power transmission belting, above recommended tension, will shorten its life as much as 68 percent!

In the tests three grades of the present wartime construction of transmission belting were used. Each belt was run at 15 pounds per inch per ply, a 720 pound total for the tension, the recommended figure, and at 18 pounds per inch per ply, a total of 864 pounds tension, on 4 inch diameter pulleys. Belts were all 6 inches wide, 30 feet long, spliced in 10 foot endless lengths. Tests were all highly accelerated.

Belt No. 1 ran for 95 hours before breakdown under the 19 pound tension, and increased its life to 230 hours before failure when the tension was 15 pounds.

Belt No. 2 ran for 88 hours at the 18 pound tension, and for 263 hours before failure at 15 pounds.

Belt No. 3 ran for 15 hours under 18 pound tension, and the service life before failure jumped to 48 hours under the 15 pound tension.

Close attention to "details" like this will save costly shut-downs and increase productive man-hours. This is just another case of designing to meet requirements — another important conservation measure.

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MOLY

By A. H. ALLEN Detroit Editor, STEEL

MIRRORS of MOTORDOM

Shifts in executive personnel reflect difficulties of operating huge new war plants with thinly spread managerial talent. . . UAW-CIO offers remedy for Willow Run. . . Machinery interest sold?

DETROIT

DESPITE its high degree of managerial "know-how," the automotive industry is meeting an increasing number of perplexing problems in the supervision and direction of some of the new "king-size" war production plants which it has undertaken to operate. Management difficulties seem to increase roughly as the square of the floor space in the plant, and the factor of bigness, while impressive to the public and perhaps to the enemy, carries with it a host of tough hurdles before production goals are reached.

Difficulties at the Ford Willow Run bomber plant have been aired to the point of becoming tiresome. Someone sagely observed the other day that the chief trouble with Willow Run was that too many people were offering expert opinions on what the chief troubles of the plant seem to be. Chrysler's Dodge Chicago engine plant, touted as being even bigger than Willow Run, has been having managerial influenza. Doubtless the new Fisher Body operation in Cleveland, which will be publicized as bigger than either Willow Run or Dodge Chicago, is destined to come in for its share of headaches. The Bell bomber plant in Georgia, large enough to house several football fields, three-ring circuses, a mile of railroad cars, a year's cotton crop and a few Liberty ships to boot, is going to tax the best managerial brains of Bell Aircraft, and this company has only come to its present eminence in recent years so that it cannot be "long" on executive talent.

O'Neil Leaves Dodge-Chicago

Last week, W. J. O'Neil, who has spent the better part of 35 years on the production side of the motor industry, gave up the reins as president and general manager of Dodge Chicago. The announcement came suddenly. K. T. Keller, president of Chrysler, called a meeting of a group of key executives, read an announcement of O'Neil's resignation and the personnel changes his retirement occasioned, and that was that. It was the first major executive reorganization in Chrysler in a long time, but the inside explanations are known only to a tight-lipped few.

Mr. O'Neil is only 61, has headed the Dodge Division of Chrysler since 1938, when he succeeded Keller as director of this largest Chrysler division. His career began in 1901 when he learned the machinist's trade at Allis-Chalmers in Milwaukee. Ten years later he took charge of the time study department at Packard, leaving there in 1914 to head the gas engine department of Fairbanks, Morse & Co. Then he became production manager for Montgomery, Ward & Co., and next works manager for A. O. Smith Co. In 1921 he came back to the automotive industry with Maxwell Motor Co. in the master mechanic's department. Five years later he was named master mechanic, and after Chrysler absorbed Maxwell he was appointed plant manager of the Dodge Division in 1928.

When the Dodge Chicago operation was started by Chrysler last June, O'Neil was selected to head it. With his resignation, control of the vast facility is turned over to 37-year old L. L. "Tex" Colbert, said to be one of the brightest young men in the entire Chrysler organization where he has been active for ten years. He was resident attorney under Nicholas Kelly for a time and also had experience in labor relations activity. But his ability went far beyond these phases and he served on many important operating and policy committees of the corporation, being closely associated with Mr. Keller, B. E. Hutchinson, H. L. Weckler and other top-ranking executives. He has never been closely connected with production activity, but has made an intensive study of manufacturing methods and is now getting his baptism in this field. He has been operating manager at Dodge Chicago and now becomes general manager.

WAYNE H. EDDY

One of the businessmen at Chrysler these days is H. L. Weckler, vice president and general manager, who has now stepped in to fill the breach as president of Dodge, left vacant by the retirement of O'Neil. Weckler began his career in the motor industry with Buick in 1911 and has always been a close associate of Keller, becoming his assistant in 1932 when Keller was vice president and general manager of Chrysler. It is believed that Weckler will retain direction of Dodge only until someone else has been located to handle this work.

Shifts Point to Dissatisfaction

Handling the operating load at the Dodge Division at the moment is F. J. Lamborn, who hitherto has been vice president in charge of manufacturing. Under direction of Weckler, it is conceivably possible that Lamborn eventually may move on up into the driver's seat for this division. He is an old-line toolmaker, starting with Dodge in this trade 32 years ago, and serving as master mechanic of the Dodge ordnance plant in the last war.

That all has not been progressing too smoothly at the $120,000,000 Dodge Chicago plant was evident from the recent induction of Wayne H. Eddy as production manager. He is another automotive manufacturing executive with long and varied experience, much of which has been as a sort of side-kick or protege of George T. Christopher, now president of Packard. Eddy served his apprenticeship with the Stewart-Warner Corp. in Beloit, Wis., and Chicago in toolroom and tool design department. In 1920 he went to work for General Motors at Janesville, Wis., stepping up from one job to another until in 1932 he was transferred to Buick as chief master mechanic. Later he served for a time with the Pontiac Division and finally followed Christopher to Packard where he was made production manager of the marine engine division in 1935. In the 15 years preceding this time he became widely known throughout the machine tool, equipment and supply trades.

When the Aviation Corp. undertook construction of the American Propeller Corp. in Toledo, O., in 1940, Eddy was grabbed off as plant manager and stayed there until the plant began operations last fall. Not much has been heard of him since, although recently he had been reported as serving as president of the Production Planning Co., Detroit, a group which specialized in directing the conversion of manufacturers from normal

peacetime activities to a wartime basis.

There is claimed to be no connection between the selection of Eddy as production manager at Dodge Chicago and the retirement of O'Neil as general manager, but the two developments came almost simultaneously. It would appear now that the important Chicago undertaking will be supervised by a judicious combination of Weckler, Colbert and Eddy. Their position is not an enviable one. The Finger points and the Voice says, "All right boys, there is the plant now make it click." The rest is up to them.

"Move Willow Run to the Workers"

Almost everyone from the Truman Committee to the Army Air Forces has taken a crack at telling Henry Ford what is wrong with the Willow Run plant. Latest recommendations come from the UAW-CIO which has forwarded a 16-page brief to the Truman Committee analyzing housing conditions as they bear on successful operation of the plant. In substance, the union says that on the basis of present housing programs, "achievement of employment for 89,000 workers at Willow Run is a fantastic impossibility," and hence if it is impossible to bring the workers to Willow Run only thing to do is "to move the plant in part at least to areas where both housing and workers are available." The UAW claims that at plants in Detroit, Pontiac and Flint there is plenty of floor space and by virtue of reduced ordnance production schedules there will be substantial supplies of skilled production labor shortly.

This is an altogether negative approach to the labor supply problem at Willow Run. The sensible move would be to facilitate more workers getting to the plant from their present locations and the best way to do this is to provide commuter rail transportation (which the Michigan Central says is impossible), step up the bus schedules to Willow Run from points in a 25-mile radius, repair highways in this area which have become badly deteriorated over the winter months, and raise the speed limit to 45 miles per hour. It is rapidly becoming apparent that the small saving in rubber effected by reducing speeds from 45 to 35 is insignificant when compared with the larger losses occasioned by delays in getting anywhere and the damage to automobile mechanisms resulting expressly from slow speeds. Cars everywhere are becoming seized with a "35-mile lethargy" which can be cured only by new batteries and repair bills.

H. R. Krueger & Co. of Detroit has become widely known throughout the metalworking industry for its developments in equipment for multiple drilling and tapping. In the war effort the company has pioneered revolutionary new types of equipment for automatic chambering of gun barrels. One such machine, a vertical-spindle type mounting ten gun barrels at a time, was described in STEEL for Aug. 18, 1941, p 62. Many of these units now are in operation at gun manufacturing plants throughout the country.

But of immediate interest to the trade is the report that the Krueger company has been sold to certain unnamed interests for around $650,000, with H. R. Krueger to be retained as manager for a period of several years at least. No confirmation of the reported sale is obtainable from the company, but the news comes from reliable sources and it is indicated that formal announcement may be some time away.

Krueger is known the length and breadth of the automotive industry for his genius in the field of multiple drilling and tapping.

Machine Sorts 200 Pounds Of Rivets Per Day

With the average medium bomber requiring 250,000 rivets in its construction, the problem of keeping various sizes and types of rivets sorted and freed from scrap accumulations is an important conservation measure. A rivet sorting machine has been developed and placed in use by the Fisher Body Division of General Motors Corp. in its aircraft manufacturing plants where more than 40 different types of rivets are in daily use.

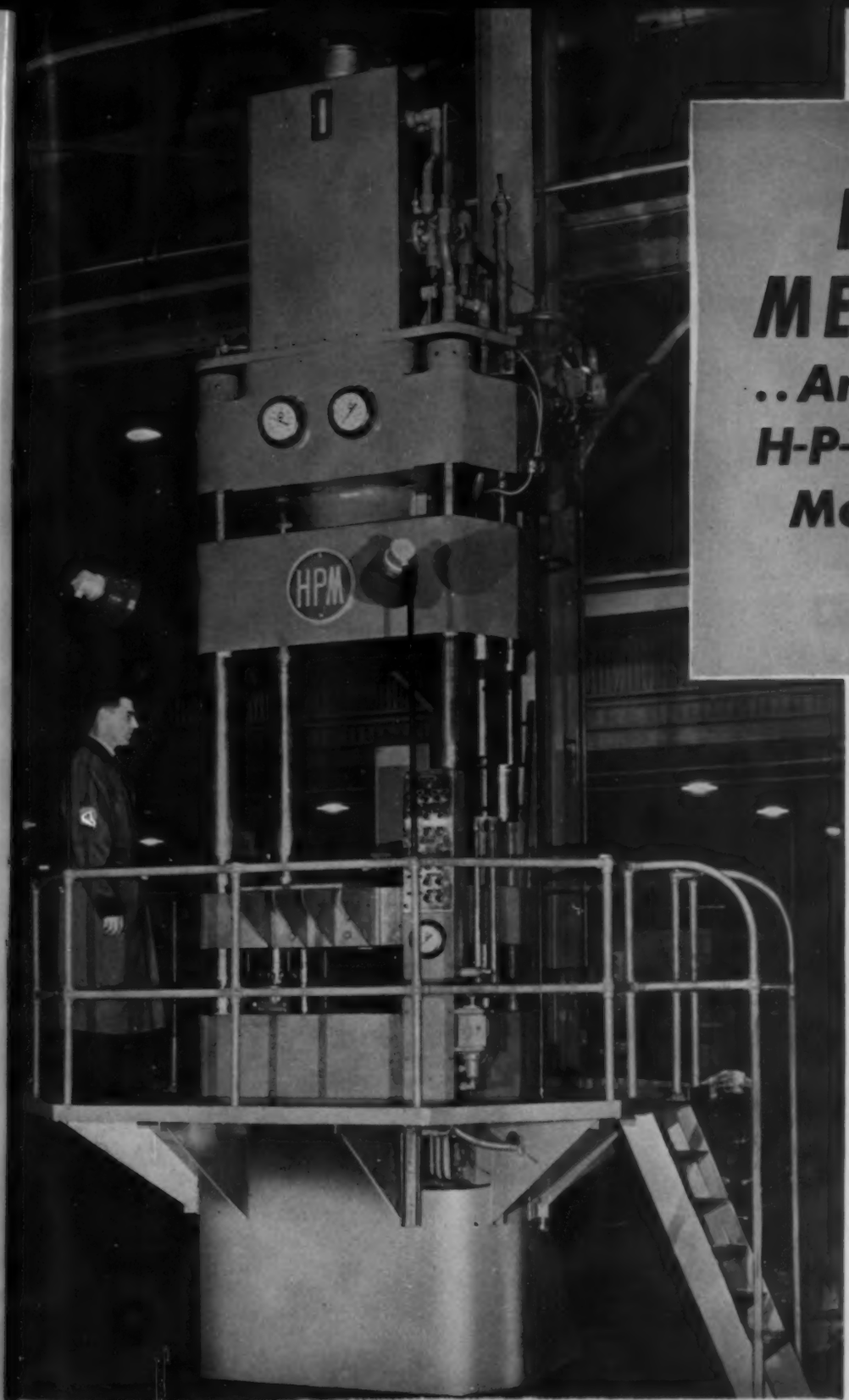
The sorting machine is in reality a battery of four machines, as shown in the accompanying illustration. Each has a primary selector which is a perforated revolving cylinder resembling a tumbling barrel. Perforations in each of the four cylinders are of different sizes, so that the rivets which fall through from each of the cylinders are grouped according to thickness, regardless of length or head type. Cylinders are interchangeable, so that there is one cylinder to fit every rivet thickness being used in the plant.

After rivets have been sorted according to thickness, they are dropped into a hopper from which they are carried on a pronged trough to the next selection operation. At the bottom of the trough the rivets, heads upward, reach a flat, disk-like selector which is notched and revolves constantly.

Each rivet slides into one of the notches. Then, as the selector turns, the various head types are kicked off by selector arms. If the machine is set for selection of round head rivets, for example, all other types are kicked off into a container, the round head rivets continuing on for selection by length, the third and final phase of the operation. Extending from the circular selector are a dozen or more small channels. As the table revolves, needles kick out the rivets according to their individual lengths.

One machine now being operated two shifts daily has an average output of 200 pounds of rivets sorted per day, an important contribution when it is realized that the average cost of rivets is around $1 per pound.

A RIVET sorting machine is shown classifying mixed rivet stocks according to diameter, head style and length. Perforated hopper (left) grades according to diameter; circular selector tables (right) select head styles and lengths, depositing similar rivets into specific containers



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H-P-M "all-hydraulic" presses have pioneered the application of modern hydraulics to many manufacturing methods. For example: die straightening of malleable castings, rubber pad forming of sheet metals, injection molding of plastics, and high speed deep drawing of sheet metals, forging and coining. All have been accepted by leading manufacturers.

Today, another hydraulic press application—Powder Metallurgy—is becoming prominent. The Hydraulic Press Manufacturing Company invites those interested in powder metallurgy to bring their press requirements to H-P-M.

The H-P-M "Closed Circuit" press operating system with the H-P-M HYDRO-POWER radial piston type hydraulic pump assures uninterrupted press service. Regardless of your metal working press application—choose H-P-M FASTRAVERSE Presses—proven and accepted by modern industry. Write today for details.

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WING TIPS

Aircraft Scheduling Unit attacks materials distribution problems for aviation contractors. . . . Army-Navy-civilian co-operation points way to equitable allocations and relief of critical shortages

IN a concentrated effort to co-ordinate the material and equipment needs of aircraft manufacturers and their thousands of subcontractors, the Materiel Center of the Army Air Forces at Wright Field, Dayton, O., last fall reorganized its Production Resources Section, and assigned to it four major responsibilities:

1. To estimate and calculate quantities of basic raw materials required to meet the various aircraft programs directed by the Aircraft Scheduling Unit, the latter group including Col. E. M. Powers, administrator, representing the Army Air Forces; Capt. L. D. Webb, for the Navy Bureau of Aeronautics; and Col. W. S. Cave for the British. (This joint committee was devised as the most efficient means for orderly determination of the urgency and extent of various proposed aircraft construction programs.)

2. To determine productive capacity of industries available to meet the aircraft program requirements; recommend expansions and conversions; assemble data on which to base allocations; scheduling and distribution of machine tools and plant equipment to prime contractors and subcontractors.

3. To allocate initially, and subsequently schedule and distribute to contractors the materials allotted to the aircraft industry by the WPB; and maintain a central shortage and surplus register in connection with such distribution duties.

4. To maintain data on all priority regulations; receive applications for preference ratings and re-ratings; maintain such priority records as may be required for successful operation of the Controlled Materials Plan.

PRS Is Military Organization

Strictly a military organization, the Production Resources Section operates closely with the "claimant agency" of the aircraft industry under CMP, or through the Aircraft Scheduling Unit which represents the "claimant agency". The ASU, with members representing the Army, Navy, and British, is identified also as a representative of T. P. Wright, director of the Aircraft Resources Control Office, on which the army representative is Brig.-Gen. B. E. Meyers, and the navy representative Rear Admiral E. M. Pace. The ARCO in turn operates directly under the WPB's Aircraft Production Board, headed by C. E. Wilson and including Lieut.-Gen. W. S. Knudsen, Maj.-Gen. O. P. Echols and Rear Admiral Ralph Davison.

This organizational detail sounds quite complicated and indeed it is for anyone not intimately associated with the varied activities involved. The confusion will be tempered by understanding the fact that the entire system is essentially a military-civilian co-operative plan to help manufacturers obtain materials and to relieve and avoid critical shortages.

Continuing with the organization of the Production Resources Section in Dayton, executive officer is Col. E. W. Rawlings who supervises the work of an administrative staff and four principal branches, each concerned with one of the four major responsibilities previously outlined—Requirements, Material Distribution, Industrial Resources, and Priorities. All of these branches have a number of subsidiary units. Considering the Material Distribution Branch, which is of principal interest to readers of STEEL, five units are concerned with steel, nonferrous metals, light metals, nonmetallics and aircraft hardware, while a sixth unit involves a materials co-ordinator.

LIEUT.-COL. PETERKA
Chief, Material Distribution Branch, Army Air Force, Wright Field, Dayton, O.

Administrative staff of the Material Distribution Branch is another example of Army-Navy co-operation in expediting manufacturing needs of both branches of the service, which has proved eminently successful in operation. Chief is Lieut.-Col. A. E. R. Peterka, assisted by Lieut.-Commander J. M. Weldon, acting for the Navy Bureau of Aeronautics, and Major T. T. Metzel of the Army Air Forces.

Functions of the Material Branch may be summarized in three directions:

1. Recommend to the Aircraft Scheduling Unit quantities of raw materials required to be allocated to contractors.

2. Schedule and distribute raw materials, allocated by WPB; designate prime and secondary consumers to whom controlled basic materials (steel, aluminum, copper) are to be allocated; and also aircraft hardware and nonmetallic such as plywood, plastics, veneer, chemicals, ceramics, cotton duck, webbing, nylon, methyl methacrylatae, lumber, etc.

3. Correct, alleviate or prevent production stoppages resulting from critical materials shortages, and redistribute idle and surplus stocks of aircraft material.

ASU Relieves Shortages

In accomplishing these ends, it is seen that the branch acts in the name of the Aircraft Scheduling Unit in distributing materials and relieving shortages. The Steel Unit of the branch is organized into four operational subunits—tubing; bar, rod and wire; forgings; and sheet, strip and plate—and an analysis unit.

One of the first problems to be attacked by the unit, working in co-operation with the Steel Division of the WPB, has been the distribution of aircraft alloy steel. Intensive study by the two groups developed the fact that, in general, allocations of the WPB Requirements Committee in terms of total ingot tons have been about 20 per cent of total alloy steel production, and as such have been adequate to meet the requirements of aircraft programs if the tonnage had been properly distributed; further that approved melting schedules for aircraft alloy steel have been in excess of calculated requirements in point of total tonnage, but not necessarily by products. Thus, the WPB directs each alloy steel producer to set aside a certain tonnage of ingots each month for aircraft use, but so far has been unable to extend allocations further along the line so that the proper quantity of products—bars, rods, wire, sheets, etc.—would flow to indicated users. Result is that critical shortages appear (though in decreasing number as will be shown later), despite the fact that apportionment of ingot production is satisfactory to cover requirements.

The sole exception to this "product difficulty" in alloy steel distribution is steel tubing, which is rigidly allocated under a plan introduced over a year ago and covering all steel tubing used in the aircraft industry. Briefly, this plan calls

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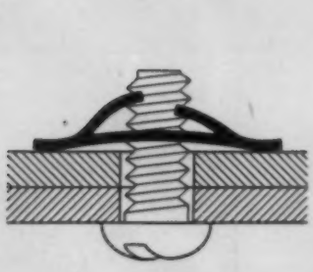
Speed Nut System (PATENTED)

conquers vibration loosening



High-frequency vibration never made a nut hold firmer. Speed Nuts are made to grip the bolt or screw with a double spring-tension lock to absorb vibration and prevent loosening.

The harder the jam, strain or pull to separate two assembled parts, the firmer the Speed Nut prongs grip into the roots of the threads. That is what makes them about 4 times tougher than other lock nuts.

Over 1000 shapes and sizes have already been put into production. Every Speed Nut or Speed Clip has saved from 50% to over 80% in assembly time and weight. Already this has saved countless man-hours time and tons of material. Our Engineering Dept. will gladly assist you on the proper approved locations where Speed Nuts give maximum engineering advantages.

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for buyers to submit requirements on Form ASU-18, covering size, shape, grade, three mill preferences and the required delivery schedule. These are now cleared through the Materials Distribution Branch, which designates specific tonnages according to producing mill and buyer.

While the flow of steel tubing from mill to end product is considerably more simplified than is the case with some other products, like bars for forgings, for example, it is becoming increasingly apparent that the method of tubing allocation is an "ideal" arrangement.

Steel's "Time Cycle" Not Understood

There are other important explanations of delinquency in distribution of aircraft alloy steel. Some of them are: Late ordering; ordering in too small quantities; improper scheduling of orders as to date required; failure to notify steel producers when shipment should be delayed or canceled; failure to place orders with mills best qualified to produce; inaccurate coding of orders; lack of recognition of the fact that steel has the lengthiest "time cycle" (from production to use) of any basic aircraft material; mill schedules based on priority ratings, dates of orders and contractor's statement of need, none of which reflects actual delivery requirements for end product.

Mills now are required to segregate all aircraft alloy steel orders when submitting proposed schedules on Form PD-391 for approval. Sifting of this great mass of data, usually covering several thousand pages of reports, yields what are termed "In" and "Out" schedules, the former being tonnage which must be melted for delivery in the next two or three months following the report; the "Out" schedule being orders which must be melted for later delivery, because of lower urgency rating.

For example, in January the "In" schedule involved some 191,000 ingot tons, while the "Out" schedule carried another 115,000 tons, or a total of 306,000 tons. The only way the "In" schedule can be disturbed to include a critical tonnage in the "Out" schedule is to remove a like tonnage of the same form to make way for the critical item. The "Out" tonnage requirement has built up largely as the result of substantial allotment of alloy steel under lend-lease last summer, plus a delay in bringing in projected new electric furnace melting installations.

There are several ways this "Out" schedule can be reduced. One is to ask tool steel mills to finish a portion of aircraft alloy requirements. Another is to study the diversion of some electric furnace steel requirements to open-hearth plants. A third is to switch to centrifugal steel castings instead of forgings in such large-tonnage items as engine cylinder barrels. Also, the substitution of NE steels has possibilities of which full advantage has not been taken.

In respect to the NE steels, the difficulty of adhering to chemical analysis limits because of changes in character of raw materials is proving troublesome to some mills, and further the price structure of the NE steels often results in their costing more than the originally specified S.A.E. alloy grade, so the urge to substitute is not too keen.

It is strongly felt that standardization of inspection procedures would make available to all contractors a wider range of products and save much time and confusion.

Actually, the high "Out" schedules shown by analysis of PD-391 reports may be artificially inflated, due to inventories on hand or because urgency ratings have not been determined accurately.

To get a more accurate picture of this situation, the Aircraft Scheduling Unit has been "screening" schedules to determine urgency factors other than preference ratings established by the Joint Aircraft Committee. The latter ratings are generally in accordance with "end use"—experimental ships, modification centers, combat ships and so on down to trainer airplanes. But other factors of urgency become apparent. Suppose for example, a contractor producing trainer airplanes needs only a small poundage of alloy steel to complete 50 airplanes, which he cannot obtain because a manufacturer of combat ships has a higher rating on a similar grade of steel, but actually may not need the steel for some weeks. Obviously the trainer plane builder should get his steel, but the problem is how to weigh such situations and arrive at equitable solutions.

Steel Group To Study Ratings

To assist in evaluating urgency ratings and also to consult on improved distribution procedure for aircraft alloy steel, an industry committee has been organized to work with the Aircraft Scheduling Unit and the Steel Division of WPB. It includes N. J. Clarke of Republic Steel, representing sales and distribution; Walter Mathesius of Carnegie-Illinois Steel, representing production; F. R. Brugler, Bethlehem Steel, handling statistics, and E. G. Walton of Crucible Steel Co. of America, on metallur-

REPORT OF CRITICAL SHORTAGE

BEFORE SUBMITTING A CRITICAL SHORTAGE REPORT, IT IS REQUIRED THAT BOTH REPORTING AND REPORTED COMPANIES USE EVERY MEANS AVAILABLE TO OBTAIN SATISFACTORY DELIVERY OF ITEMS INVOLVED.

Date _____ (Insert your Ref. number)

1. Company reporting _____ Address _____
2. Description of your part or material short _____ (Give details if possible)
3. Your Order No. on Vendor ( ) Mill ( ) or Foundry ( ) _____ Date _____
4. Total quantity on order _____ Quantity rec'd to date _____
5. Quantity required per unit or plane _____
5a. Inventory as of date of report _____

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
6. Monthly Requirements:												
6a. Monthly spares Required.												
7. Promised del./mo. ( ) or allocated ( )												

8. Vendor _____ (Name and address of plant producing items described in (2) and office contacted)
   (a) Person contacted _____
   (b) Reason given by Vendor for delay _____
17. What steps have been taken to obtain the parts or materials from other sources _____
18. Possible substitution of item described in 10-D _____
19. AUTHENTICATION _____ (By Company Representative)

(Section 35 (a) of the United States Criminal Code, 18 U. S. C. A. 35, makes it a criminal offense to make a false statement or representation to any department or agency of the United States as to any matter within its jurisdiction.)

AUTHENTICATION _____ (By Army Air Forces or Navy Field Rep. or Insp.)

AUTHENTICATION _____ (By District Supervisor, AAF or by Bureau of Aeronautics, Insp.)

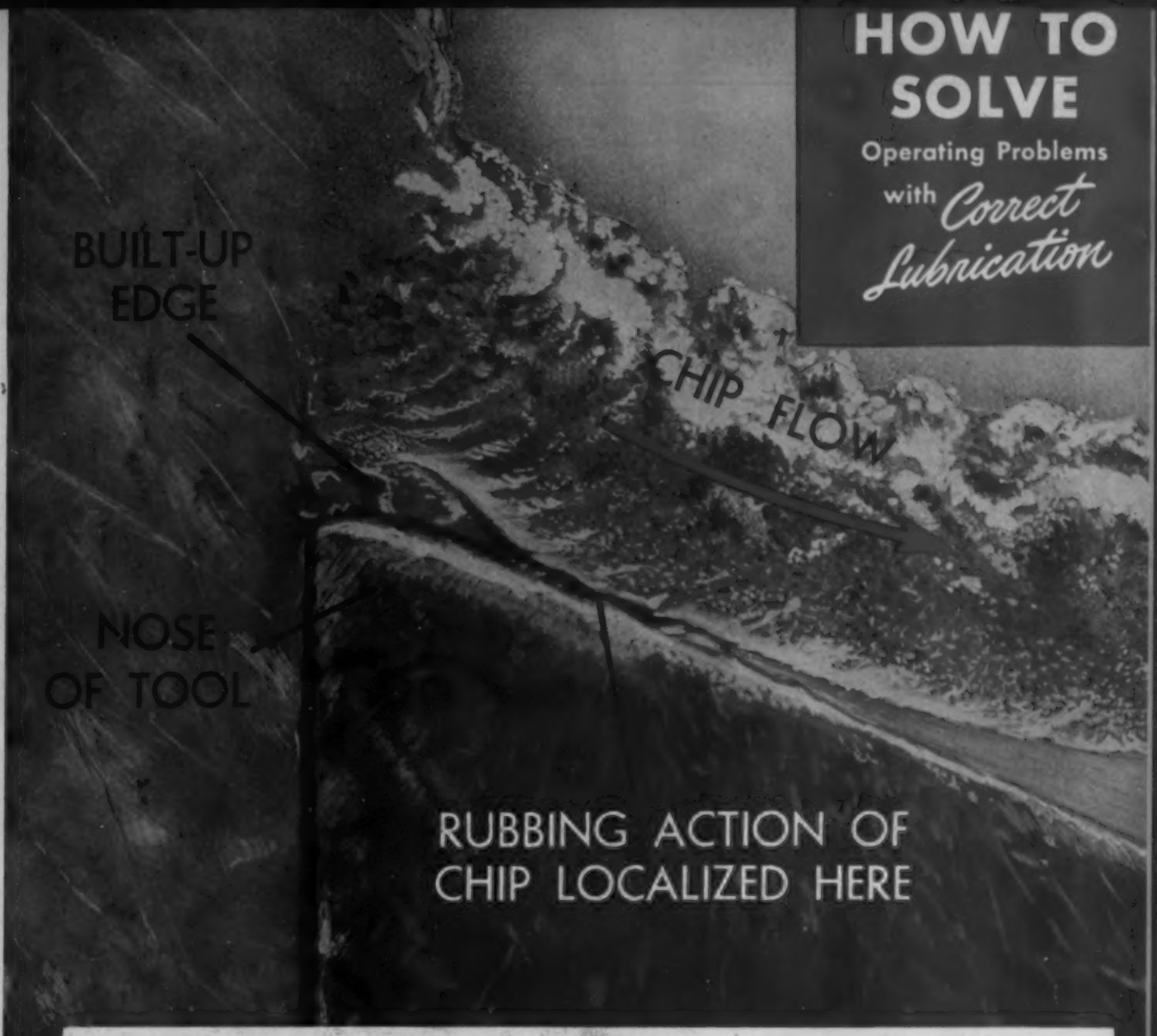
Aircraft manufacturers report critical material shortages on this Form ASU-16 to Army Air Force, Materials Distribution Branch, Wright Field, Dayton, O. Cases reduced from 6000 last July to 470 as of March 13

ONE OF A SERIES OF SUGGESTIONS TO AID PRODUCTION

ONE OF A SERIES OF SUGGESTIONS TO AID PRODUCTION

HOW TO SOLVE

Operating Problems with *Correct Lubrication*



New Facts on Metal Cutting

THE PICTURE ABOVE is a photographic enlargement of the cross-section of a tool cutting metal. NOTICE THE BUILT-UP EDGE. That small piece of metal alternately builds up and sloughs off. It is the key to tool life and work finish.

The built-up edge, during its existence on the cutting edge, exerts the pressure which does the actual cutting or shearing of the metal.

Sufficient build-up protects the cutting edge by localizing the rubbing action of the chip some distance from the cutting edge.

Excessive build-up is squeezed between the tool and the work and spoils the finish. *Adequate mobility* prevents this, and enables the built-up edge to slough off with the chip.

The "anti-weld" property of the cutting fluid controls the size and mobility of the built-up edge!

In the laboratory and in practice Socony-Vacuum technicians have isolated and studied many other factors necessary in a cutting fluid.

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CALL IN SOCONY-VACUUM

gical problems. This committee already has met several times in Dayton and Washington, with WPB administrators and representatives of the Material Distribution Branch. Considerable progress has been made in the direction of mutual understanding of problems involved. Next projected step is to include on the committee representative users of aircraft alloy steel.

One of the most effective jobs the Material Distribution Branch has accomplished in the past eight months is the relief of critical shortages of materials going into aircraft production. As such shortages develop, manufacturers report the facts to the ASU at Dayton—until Oct. 15, 1942, on Form ASU-5, since then on Form ASU-16. As of last July there were about 6000 such shortage cases awaiting disposition in Dayton—2500-3000 involving steel, 1000-1200 aircraft hardware, 1600-1800 nonferrous materials, 250 light metals (low because aluminum and magnesium are allocated) and 200-300 nonmetallic.

Materials Shortages Drop

As of the week ending March 13, the total shortages reported to Dayton had dropped to 470, of which 153 were in steel, 200 in aircraft hardware, 49 nonferrous, 59 light metals and 9 nonmetallics.

Procedure by which this noteworthy job has been effected is substantially as follows: A manufacturer facing a shortage supplies all details on form ASU-16, with 18 items filled out in five copies, (one for his own files). The report is then authenticated by the Resident or nearest Navy Inspector or Air Force field representative, who keeps one copy and forwards three copies to the nearest procurement district headquarters, of which there are four in the U. S.—New York, Detroit, Wichita, Kans., and Santa Monica, Calif. These offices make every effort to relieve the shortage on the basis of district data, perhaps from warehouse stocks or surplus stock reports, but if this is not possible, they forward two copies to the ASU at Dayton, which goes to work on the matter. Usually the Dayton office can work out a solution, but in the event it is not possible, one copy is forwarded to Washington for assistance from the proper material division of WPB.

When shortage reports are received in Dayton, the attempt is made to get action within 10 days. The ASU works closely with the Steel Recovery Corp. and keeps a running register of surplus stocks. So far, better than half the shortages have been relieved by district procurement offices, and the results ASU at Dayton has been able to effect are shown graphically in the figures previously cited. Comparatively few shortage reports ever get to Washington.

As an example of the relief provided by ASU in Dayton, a recent week's summary showed the following relieved from surplus stocks recorded in Dayton:

Steel tubing	48,717	feet
Other steel	60,650	pounds
Aluminum tubing	45,755	feet
Other aluminum	36,049	pounds
Nonferrous metals	8,630	pounds
Aircraft hardware	130,975	pounds
Aircraft hardware	1,128,146	pieces
Chemicals, etc.	10,520	pounds
Chemicals, etc.	980	gallons
Vendors involved	60	
Buyers involved	75	

Another significant step taken by the ASU and WPB working in co-operation is the aircraft warehouse system, under which 26 strategically located warehouses have been selected to carry stocks of certain standard sizes and grades of aircraft alloy steels. Minimum quantities for various products have been set, and contractors are instructed to place all orders for less than these quantities with warehouses only, where standard sizes and grades are involved.

This immediately brings up the problem of stocking the warehouses. Some help has been provided by allotment of extra tonnage to aircraft steel warehouses by the Requirements Committee of CMP.

Analysis of the personnel of the Material Distribution Branch, headquartered at Steele High building in Dayton, shows the following:

Unit	Army officers	Navy officers	Army Enlisted Men	Civilians (Male & Female)	Total
Steel	18	4	9	42	73
Light metals	16	6	1	59	82
Nonferrous	4	1	2	24	31
Nonmetallic	4	3	1	20	28
Materials coordination	13	3	7	46	69
Hardware	1	1	0	10	12
Administrative	1	0	0	26	27
Executive	2	2	0	4	8
Total	59	20	20	231	330

Several conclusions are worthy of repetition in summation:

1. It is an example of the highest type co-operation—between the branches of the Service, between WPB and the military, and between civilian or industry personnel and the Air Arms of the Service.

2. Critical materials shortages among aircraft contractors have been reduced to less than 10 per cent of what they were last fall, despite steadily expanding aircraft production.

3. Determination of the urgency of material requirements by contractors must be extended beyond "end-use" preference, date of order placing, etc.—a knotty but pressing problem.

AERIAL TEST TUBE TO GENERATE 700-MILE-HOUR WIND

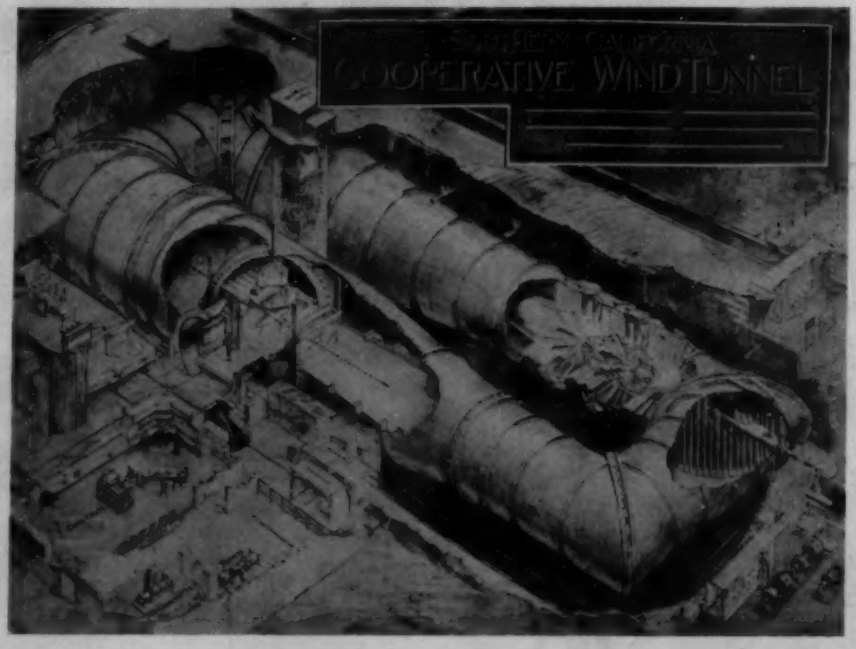


DIAGRAM sketch of the new $2,100,000 wind tunnel, capable of generating a 700-mile-an-hour wind, which is being built at Pasadena, Calif. Financed by the Consolidated, Douglas, Lockheed and North American aircraft companies, the tunnel will be operated by California Institute of Technology for research and development problems of the co-operating companies. NEA photo

Munitions Depots Developed as Reserves for Fighting Fronts

TORONTO, ONT.

RESERVE stores of munitions and war supplies are being established in Canada as part of a strategic plan to meet emergency demands from combat zones in various parts of the world, announces C. D. Howe, Minister of Munitions. Production has reached a stage where adequate reserves can be accumulated, he said. Crated motor vehicles are being stored beside railways at various locations for quick dispatch to fighting fronts, according to emergency demands. Establishment of these dumps will expedite transfer of supplies as they are required in various theaters of war and obviate delays in shipment from one combat zone to another.

Aluminum and two of the chief raw materials entering its manufacture, bauxite and cryolite, have been placed under formal allocation by the Department of Munitions and Supply. The new order provides for strict regulation of movement and further restriction on end use. Use of bauxite for abrasives and cryolite for insecticides is continued.

By agreement with United States authorities a Crown company has been incorporated under the name of North West Purchasing Ltd. to assist the United States War Department, north west division, and to purchase all requirements obtainable in Canada for the Alcan highway and associated projects. Head office is at Edmonton, Alta.

Ease Metal Restrictions

Because of the need to increase food production the Munitions and Supply Department will ease restrictions governing use of metals for new electric service to producing farms. The former order required a permit for materials for service where existing lines were too far removed and where the distance exceeded 250 feet. The new order allows extension of 600 feet without permit. Use of conductors from existing surplus, excess, dormant or second-hand stocks should be utilized where possible. Galvanized steel or iron wire may be used.

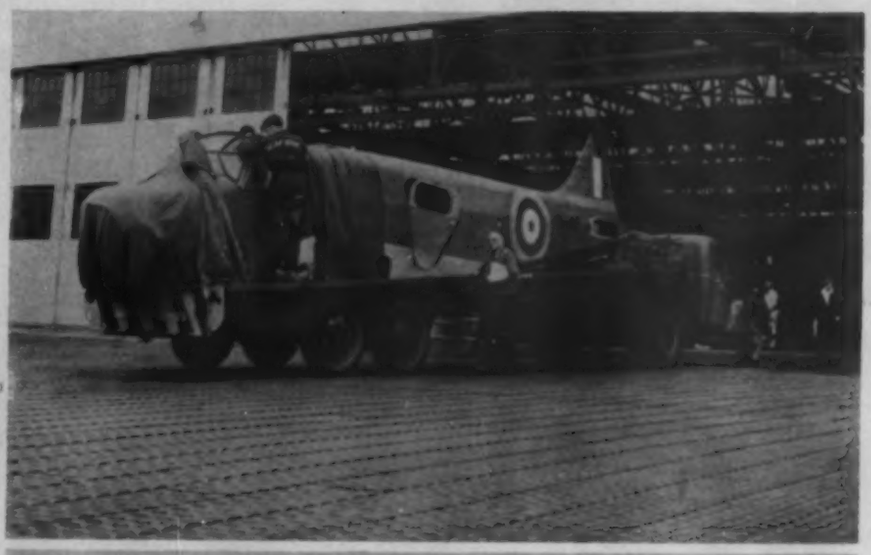
The steel controller has promulgated a new order providing that no person may buy or sell scrap except those licensed by the government. Licenses will expire March 31 and will be renewed on application, without cost.

New sources of vanadium are being sought, supply formerly coming from Peru, northern Rhodesia and the United States. Ash residues from oil-burning ships are being collected for recovery of small quantities of vanadium and experiments are being made in recovery of small vanadium content of open-hearth slags of a Nova Scotia steelmaker, using Newfoundland iron ore.

To conserve aluminum and iron used for patterns and core boxes in the manufacture of steel castings Hull Steel Foundries Ltd., Hull, Que., is substituting a special plastic developed in its laboratories. Under this plan replacement of worn equipment is quick and easy.

Maximum possibilities in new plant and other construction have been practically reached for the duration and by July or August it will decline sharply. Despite curtailment in construction by the government, building materials are increasingly scarce, especially those in which iron, steel and other metals are principal components. W. J. McHenry, priorities officer for the Hydro Electric Power Commission of Ontario, says that public utilities are perturbed as to the source of necessary electrical equipment.

AIRCRAFT LANDING MATS—ALBERTA AND DAKAR



FROM all parts of the world photographs are received showing use of steel mats for aircraft, a significant development. Above, a wingless plane, casualty of Britain's air war, arrives at an Alberta "hospital" for repairs, trucked over steel mat. The crippled warbirds are shipped by boat to Canada for restoration and use by the R.C.A.F. Below, native laborers in Dakar help American engineers build a mile-long runway. Passed by censors

Col. A. M. Kreck of the Army presents "E" pin to M. J. Kearins, president, Whitman & Barnes, Division of United Drill & Tool Corp., Detroit. Looking on are Mayor Edward J. Jeffries, Detroit, and Rear Admiral Wat T. Cluverius

"This is a war of movement," says Ezra W. Clark, vice president and general manager, Clark Tructractor, Division of Clark Equipment Co., in Battle Creek, Mich., acknowledging the "E" award

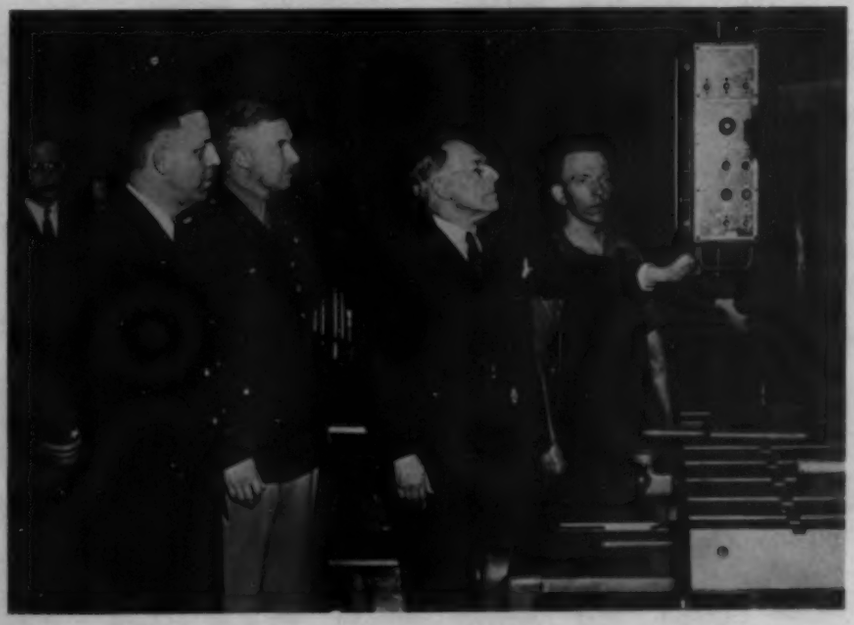
Commissioner Thomas M. Woodward presents the Maritime Commission's "M" pennant to W. F. Crawford, right, president, Edward Valve & Mfg. Co. Inc., East Chicago, Ind. Others in photo, left to right: Rear Admiral Edward E. Evers, Navy; Lieut. Col. C. L. Jordan, Marine Corps; Maj. Frank W. Renwick, Army; Henry F. Schricker, governor of Indiana

Columbia Steel & Shafting Co., Pittsburgh, receives the "E" burgee. Left to right: Tracy F. Manville, vice president; Lieut. Col. John H. Frye, Army; Fred O'Connor, president, Local 1070, United Steelworkers of America

Henry Wick, manager of operations, and William Evans, oldest employe in point of service, received the "E" burgee for Steel & Tubes Division, Republic Steel Corp., Cleveland. Col. H. M. Reedall, chief, Cleveland Ordnance district, is shown at left

Pittsburgh Steel Co., Monessen, Pa., officials and service officers hold aloft the newly-awarded pennant. Left to right: Lieut. Col. Ralph L. Dunckel, Army; Peter Sansco; Joseph H. Carter, company president; Henry A. Roemer, chairman of the board; E. J. Protin, operating vice president; Commander Carl E. Egeler, Navy

Doubled production of horizontal boring mills since Pearl Harbor won the "E" for Lucas Machine Tool Co., Cleveland. Left to right: Lieut. Commander J. P. Sturges, Navy; Lieut. Col. Harry P. Croft, Army; George A. Yost, Lucas president; Ed Soper, machinist



War Plants Win "E" Pennants

Awarded the joint Army-Navy production pennants last week for outstanding output of war materials were the following companies:

Allied Products Corp., Detroit and Hillsdale, Mich.
Alloy Steel Gear & Pinion Co., Chicago.
American Aluminum Ware Co., Newark, N. J.
American Cyanamid & Chemical Corp., American Powder Division, Maynard, Mass.
American Foundry Equipment Co., Mishawaka, Ind.
American Key Can Co., Chicago.
American Laundry Machinery Co., Cincinnati.
Animal Trap Co. of America, Lititz, Pa.
Armour Laboratories, Division of Armour & Co., Chicago.
Arnold Engineering Co., Marengo, Ill.
Baldwin Locomotive Works, Eddystone, Pa.
Borg-Warner Corp., Mechanics Universal Joint Division, Rockford, Ill.
Columbian Vise & Mfg. Co., Cleveland.

C. B. Cottrell & Sons Co., Westerly, R. I.
Couch-Uthe Co., Elyria, O.
E. I. du Pont de Nemours & Co. Inc., Morgantown Ordnance Works, Morgantown, W. Va.
Eclipse Lawn Mower Co., Prophetstown, Ill.
Fisher Co., Charles City, Iowa.
Gent Machine Co., South Euclid, O.
Golden State Co. Ltd., Tulare, Calif.
Harrison Radiator Co., Division of General Motors Corp., Lockport, N. Y.
Holcomb & Hoke Mfg. Co., Indianapolis.
A. F. Holden Co., New Haven, Conn.
Hynson, Westcott & Dunning Inc., Baltimore.
Irwin Augur Bit Co., Wilmington, O.
Kelley-Koett Mfg. Co., Covington, Ky.
Ladish Drop Forge Co., Cudahy, Wis.
Lalance & Grosjean Mfg. Co., Woodhaven, N. Y.
Lowell Wrench Co., Worcester, Mass.
Lufkin Rule Co., Saginaw, Mich.
Midwest Piping & Supply Co. Inc., St. Louis.
Morey Machinery Co. Inc., Astoria, Long Island, N. Y.
Norquist Products Inc., Jamestown, N. Y.
Ogden Arsenal, Ogden, Utah.
Pangborn Corp., Hagerstown, Md.
Press Wireless Inc., Hicksville, Long Island, N. Y.
Shure Brothers, Chicago.
F. W. Sickles Co., Chicopee, Mass.
L. S. Starrett Co., Athol, Mass.
Wilson Mechanical Instrument Co., New York.

Maritime Commission "M" awards have been presented the following:
Federal Shipbuilding & Dry Dock Co., Kearny, N. J.
Mine Safety Appliances Co., Pittsburgh.

MEETINGS . . .

Machine Tool Forum April 6, 7

FOR the eighth time since its inception in 1936, the Machine Tool Electrification Forum will be held at the plant of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., Tuesday and Wednesday, April 6 and 7, 1943.

Planned originally as a meeting of machine tool and electrical engineering minds on certain common problems having to do primarily with electrical drive and control of metalworking machinery, the scope of the meetings and attendance has grown to such an extent that the forum now is recognized in the machine tool industry as an annual event of major importance to engineers, designers and company executives.

While programs of the earlier forums centered mainly on machinery electrification as the machine tool industry cooperated more and more in its planning many subjects of broad general interest have been introduced and have met with favorable acceptance. This increasing co-operation on the part of the machine tool builders is particularly noticeable in this year's full and well rounded schedule of events, which includes a "Report from Washington" by Tell Berna, general manager, National Machine Tool Builders' Association. The program follows:

Tuesday, April 6

MORNING—ROOM 12-L-25
8:30—10:15
Registration
10:15—1:00

Welcoming Address—L. F. A. Mitchell, manager, Machinery Electrification Section.
Contributions to Victory—G. Edward Pendray, assistant to president, Westinghouse Electric & Mfg. Co.
Tool Grinding and Its Relation to Motor Selection (including sound film "Chips")—R. H. Clark and W. J. Pelich, Warner & Swasey Co.
The Mathematical Analysis of Special Control Circuits—R. S. Elberty, New Britain Gridley Machine Division.

1:15—2:15
Luncheon
Officials' Dining Room, 11-N

AFTERNOON—ROOM 12-L-25
2:30—4:30
Electronics at Work

Demonstrations — Dr. P. Thomas — Research Laboratories, Westinghouse Electric & Mfg. Co.
Electronic Adjustable Voltage Motor Control—T. R. Lawson, Electronics Control Section, Westinghouse.
Open Discussion
Machine Tool Oil Mist and Smoke Removal—E. H. R. Pegg, precipitron engineer, Westinghouse.
Open Discussion

Wednesday, April 7

MORNING—ROOM 12-L-25
9:00—1:00

Training Unskilled Machine Operators—Dr. Horace Frommelt, director of education, Kearney & Trecker Corp.
Practical Applications of Induction Heating—Frank W. Curtis, design engineer, Van Norman Machine Tool Co.
Hydraulic vs. Electric Drives—Round Table Discussion—Leader, R. A. Cole, Norton Co.; E. Y. Seborg, Barnes Drill Co.; E. M. Taylor, Heald Machine Co.; E. N. Seyferth, Ex-Cell-O Mfg. Co.; G. M. Glass, Gisholt Machine Co.; B. P. Graves, Brown & Sharpe Mfg. Co.; and R. Herrstrom, Rockford Machine Tool Co.

1:15—2:15
Luncheon
Officials Dining Room

AFTERNOON—ROOM 12-L-25
2:30—4:30

Report from Washington by Tell Berna, chairman. This will include talks by John Gammell and John C. Borden from WPB and a question and answer period. Also a talk by a member of the British Purchasing Commission.

EVENING
Hotel William Penn, Silver Room and Urban Room
6:30—10:00

Annual Banquet—C. B. Stainback, host, manager of industrial department, Westinghouse.
"Some Things to Think About", James Y. Scott, president, Van Norman Machine Tool Co.

LOCAL TRAIN SCHEDULE
To East Pittsburgh—A. M. Trains
Lv. Pittsburgh—7:39, 8:00, 8:45
Arr. East Pittsburgh—8:16, 8:28, 9:30

To Pittsburgh—P. M. Trains
Lv. East Pittsburgh—4:31 5:07 5:10
Arr. Pittsburgh—5:08, 5:35, 5:45

Iron and Steel Institute To Eliminate Banquet

Fifty-second general meeting of the American Iron and Steel Institute will be held at the Waldorf-Astoria, New York, May 27.

Meeting will be limited to the general session in the morning and the special sessions in the afternoon. The evening banquet will be eliminated.

Attendance will be restricted to members.

—o—

American Gas Association—twentieth annual distribution conference, Netherland Plaza, Cincinnati, April 29-30, and the joint production and chemical committee conference at the Hotel Pennsylvania, New York, May 24-25.

—o—

American Institute of Electrical Engineers—Five conference sessions, a general session, and three technical sessions are scheduled at the northeastern district technical meeting in Wendell Hotel, Pittsfield, Mass., April 8-9. C. E. Smith, vice president, New York, New Haven & Hartford railroad, will speak on "Railroad Transportation in the Present Emergency." Exhibits of various Pittsfield products will be displayed.

—o—

American Supply and Machinery Manufacturers' Association Inc.—Wartime conference will be held May 10-12 in Netherland Plaza hotel, Cincinnati. The program will include discussion of manpower, production, distributor's part in the war effort, and a session on postwar thinking.

—o—

National Association of Sheet Metal Distributors—War conference, May 17 and 18, Hotel Cleveland, Cleveland. Sessions will be addressed by officials of the War Production Board and Office of Price Administration.

Zinc Convention Canceled

American Zinc Institute announces that its annual convention, customarily held in St. Louis in April, will not take place this year, in order that transportation and war production effort may be conserved. A meeting of active members and directors will be called next month in New York to deal with essential matters.

A citation of Individual Production Merit, highest honor that the nation bestows on civilian war workers, has been given to Walter W. Brown, engineer of General Electric Co.'s transportation department, by the War Production Board for his accomplishment in redesigning Army searchlight cable couplers. The citation is the seventh to be awarded by the WPB. Brown's redesign of the couplers simplifies their manufacture, and saves brass, bronze, and aluminum.

Sales, Wages at Highest Volume; Owners' Share Near Lowest Level

UNITED States Steel Corp. in 1942 received for its products and services the largest sum of money in any year in its history. It paid out the largest sum in any year for wages and for products and services bought from others. But it earned for its stockholders the smallest sum per dollar of sales in any year when it had earnings, except in two years.

These facts are set forth in the corporation's annual report, which explains that fixed prices and greatly increased wage and tax costs are responsible.

Steel ingot production by the corporation was 28 per cent greater than during the peak year of the first World war, and exceeded 30,000,000 net tons. This record production, Chairman Irving S. Olds points out, was only one of several principal contributions to the war effort. These contributions were enumerated as follows:

"First, a record volume of steel and other materials needed not only for the fabrication of essential war products but also for the creation of new facilities to make such war products has been produced. Second, the technical ability representing many decades of accumulated research and experience has been made available for the requirements of the government. Third, the construction and operation of vast new facilities for the government in connection with the war effort have been undertaken. Fourth, millions of dollars of U. S. Steel's funds have been expended for various facilities contributory to the war effort."

70,000 Employes Enter Service

Accompanying table describes what disposition was made of the $1,865,951,692 received by the corporation from its sales of products and services.

Employment costs of $783,000,000 were 25 per cent greater than for the previous year. Last year's taxes of $204,000,000 were 21 per cent greater than in 1941. Dividends to stockholders were unchanged. The amount carried forward for future needs was 78 per cent less than in 1941.

In discussing manpower, the report states that approximately 70,000 men and women have left the employ of the corporation to serve the nation in the armed forces. To replace these employees, and to meet manpower requirements, nearly 100,000 employes have participated in an intensive training program. "The subsidiaries thus far have met turnover and personnel recruiting problems with success, as is illustrated by the excellent operating levels maintained during 1942," Mr. Olds said.

"To further the war program, U. S. Steel, so far as permitted, has assisted various outside producers of war material through making available to them its knowledge and experience." As an illustration, the development of the airplane landing mat is cited. The serious problem of handling plane landings on hastily built air fields was solved with the war-time invention by Carnegie-Illinois Steel Corp., a subsidiary, of a landing mat, consisting of portable interlocking steel sections. As mass production methods were evolved, other companies were licensed to use the process, and thirty smaller manufacturers are now producing these landing mat sections in quantity.

Co-operate with Others

A similar instance of sharing the "know-how" is illustrated by the fact that last year more than 500 representatives of smaller manufacturers examined new processes of munitions manufacture at subsidiary company plants. These manufacturers are now employing these procedures in the production of an important munitions item.

Pointing to U. S. Steel's shipbuilding accomplishments during 1942, the report reveals that one subsidiary, Federal Shipbuilding & Dry Dock Co., completed more destroyers for the Navy in shorter building time than any other shipyard in the country. A new shipyard built for this subsidiary for the Navy began operations five months after ground was broken. Federal deliveries of 64 ships tripled in value its deliveries for 1941, and more than equaled the combined values of its completed ships during the six preceding years. This service to the Navy and U. S. Maritime Commission was possible because Federal continued in the shipbuilding business despite heavy financial losses during a number of years following the last war.

An interesting comparison of the use of U. S. Steel's own resources and of government funds for the expansion of emergency facilities undertaken by U. S. Steel from June, 1940, to the end of 1942, shows that the ratio of U. S Steel's investment to the use of government funds was 65 cents of its own money to every dollar of government funds used. This compares with a ratio for all industry of 27 cents of private funds to one dollar of government funds.

During 1942 U. S. Steel subsidiaries expended a total of $117,546,022 for additions to and betterment of property. In discussing the expansion program, the report says: "In considering the recent expansion of facilities, it is well to recall that early in 1940 during the hearings before the Temporary National Economic Committee, U. S. Steel was charged with having unneeded capacity. It was not foreseen by these critics that very shortly steel would be required for a multi-ocean navy, thousands of merchant ships, scores of thousands of airplanes and tanks, and for other needs of the United Nations. But U. S. Steel then contended that the true function of the steel industry is always to be prepared to satisfy the nation's needs for steel whether in peace or war. That was a restatement of U. S. Steel's historic policy. U. S. Steel was able to produce the types, quality and volume of its 1942 output because in the ten years prior to 1940 it had spent about $600 million for new and improved facilities. Since then, about $431 million more of its funds has been authorized for additions, improvements and replacements."

COSTS AND SALES IN 1942 AND 1941 SUMMARIZED

	1942	1941
Products and Services Sold	$1,865,951,692	$1,622,355,922
This sum was disposed of as follows:		
Wages, salaries, social security taxes and pensions	782,661,701	628,275,135
Taxes—federal, state and local	203,755,157	168,645,848
Products and service bought from others	648,401,343	579,640,279
Wear and usage of facilities	128,161,530	98,590,187
Estimated additional costs caused by war	25,000,000	25,000,000
Interest on indebtedness	6,153,392	6,033,398
Dividends on cumulative preferred stock	25,219,677	25,219,677
Dividends on common stock	34,813,008	34,813,008
Carried forward for future needs	11,785,884	56,138,390
Total	$1,865,951,692	$1,622,355,922

LeTourneau Acquires Aluminum Manufacturing Plant

National Aluminum Mfg. Co., Peoria, Ill., has sold its present plant, containing 50,000 square feet of floor space to R. G. Le Tourneau Inc., and will transfer its activities to a farm tools plant which it has purchased. The new plant, with 65,000 square feet, will permit expanded operations.

—o—

The twentieth anniversary of the Vulcan Mold & Iron Co. was celebrated at the annual meeting of stockholders March 16 at the company's offices in Latrobe, Pa. Stockholders and guests inspected the newly expanded plant and watched production of ingot molds and large alloy molds used for centrifugal casting of guns.

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Ajax Hand Brake Co., Chicago, has moved from 59 East Van Buren street to 4607-15 West Twentieth street.

—o—

Philadelphia office of Debevoise-Anderson Co. Inc., pig iron and coke, has been moved from the Stephen-Girard building to room 2206, Girard Trust building, South Penn Square. Paul Brooks is district manager.

—o—

St. Paul Foundry Co., St. Paul, Minn., operating for 80 years under that name, has changed its name to St. Paul Engineering & Mfg. Co., better to represent its present scope of activity.

—o—

Dumore Co., Racine, Wis., manufacturer of fractional horsepower motors for aircraft and precision grinding tools, celebrated its thirtieth anniversary March 11. The observance was limited to the noon lunch period in order not to interrupt production of war materials.

—o—

American Welding & Mfg. Co., Warren, O., will celebrate its twenty-fifth anniversary March 29 with a production-for-victory rally and presentation of service pins to veteran employes.

—o—

Liquid Carbonic Corp., 3100 South Kedzie avenue, Chicago, is issuing a company news letter, which is unusual in that it is edited by the chairman of the corporation's executive committee, C. G. Carter. Always interested in employe morale and fellowship during his term as president, Mr. Carter some months ago started the publication to maintain an association between employes in the armed forces and those at home.

—o—

Industrial Sheet Metal Works, Detroit, has changed its name to Industrial Equipment Corp. The company continues to operate under the same management and at the same address, 628 East Forest avenue.

—o—

One unit at the Christy Park works of National Tube Co., McKeesport, Pa., has achieved a record in producing 12,981 shell forgings in succession without a rejection. This was accomplished by four crews of employes, including 13 women who have replaced men called for active military duty.

—o—

Lepel High Frequency Laboratories Inc., New York, announces that Gorhen Co. Inc. is no longer in its service and that all matters relating to sale and service of its induction heating equipment will henceforth be handled directly by Lepel High Frequency Laboratories.

—o—

Winfield H. Smith Inc., Springville, N. Y., has issued a 24-page booklet summing up 42 years of progress in manufacture of speed reducers. On the text "there's more than meets the eye in speed reducers" the booklet explains what and who the company is, a background behind the product. It is well illustrated.

—o—

Majestic Co., Huntington, Ind., manufacturer of metal building accessories, including coal chutes, underground garbage receivers, circulatory fireplaces and furnaces, has bought the Brownie Mfg. Co., Fort Wayne, Ind., which has specialized in clamps and turnbuckles. It will be operated as the Brownie Clamp Division. Facilities have been moved to the Huntington plant. Production facilities will be increased.

—o—

After keen competition throughout its plants, American Car & Foundry Co., New York, has awarded the Stephenson Trophy for the best safety record of the year to its Wilmington shipyard and St. Louis Foundry divisions. The shipyard, engaged in building mine sweepers, salvage boats, lighters and tenders for the Allied navies, had an accident frequency rating of 3.28 and severity rating of .12, with a standing of 3.40 for the year. The foundry's standing was 10.75; its frequency rating, 9.81, and severity rating, .94.

SPEED PRODUCTION OF ALUMINUM CYLINDER HEADS

A NEW plant to manufacture cylinder heads for airplane motors recently was placed in operation by National Aluminum Cylinder Head Co., Cleveland, a subsidiary of National Bronze & Aluminum Foundry Co. In a brief ceremony, Frank J. Lausche, Cleveland mayor, poured the first aluminum casting. Capt. Holden C. Richardson, U. S. N., First Lieut. Lewis Fykese, Army air force, and Ellison Jeffries, committeeman of the U. A. W.-A. F. L., attended. The plant was financed by DPC and leased by Army to National Aluminum Cylinder Head Co.

Women Work Effectively in Many Occupations in Gary Steel Mills

CHICAGO

WITH steel the backbone of the war production effort, the nation's steelmaking centers have geared their facilities to maximum output with the greatest speed, and without sacrifice in customary quality. This goes for Gary, Ind., which boasts a capacity among the largest, and where the change from peacetime to wartime activity is strongly reflected.

Even outward appearances in the community, such as closely guarded properties, newly built plants, and the unprecedented flow of workmen to and from their jobs, gage this change, but the most significant evidence can be observed only by activities within the plants.

Principal steelmaker in Gary, with plants spreading over more than 1800 acres and nearly three miles of lake front, is the United States Steel Corp., which is proud of the part it is taking in winning the war. With government approval, the corporation on March 18 conducted 75 representatives of the press, Army and Navy officers, on an educational tour through its various units.

Included in the full-day itinerary were the blast furnaces and steelworks, sheet and tin mills, and armor plate plant of Carnegie-Illinois Steel Corp.; and the fabricating plant of the American Bridge Co. These units employ over 32,000 workers.

Of principal interest was the armor plate plant, which up to the present has been a closely guarded development. This plant, which adjoins the Gary steelworks, was built with DPC funds at the request of the United States Army and is the property of the Army. It was built in co-operation with Army engineers by Carnegie-Illinois, and is operated by the company. Major G. C. Wilhide is commanding officer, representing the Army. The plant is highly integrated and rolls hot slabs into finished plate, ready for heat treating in preparation for tank construction. Beyond this nothing can be said about the plant or its operations, because of military regulations.

The Gary steelworks is the world's largest completely integrated steel mill, and alone has an output almost equal to that of the entire steel industry of Japan and nearly twice that of Axis Italy. For many months, it has been operating at a rate exceeding 100 per cent of theoretical capacity. Currently, it employs approximately 23,000 persons, including war workers in the armor plate plant. The three miles of lake front has harbor facilities capable of multiple, simultaneous ore boat unloading. Ground for the plant was first broken on March 12, 1906, and the first blast furnace was blown in Dec. 21, 1908.

Principal operating units include 12 blast furnaces, 53 open-hearth furnaces, three blooming and slabbing mills, billet mill, rail mill, 160-inch plate mill, and the coke plant, which is composed of 978 ovens in 14 batteries and by-products facilities.

Break Production Records

All 12 blast furnaces had been in operation for more than a year, a record-breaking performance, until recently when No. 7 was suspended for enlargement. No. 7 furnace is being doubled in size and receiving new auxiliary equipment to increase output.

Forced draft facilities, previously not available, are being added to the No. 3 open-hearth shop and the pit facilities of the No. 2 shop have been enlarged. Due to the war, an additional open hearth has been added in the No. 5 shop. Also added at the No. 5 shop is the No. 2 hot top building for ingot mold preparation to serve all of the open-hearth shops.

Soaking pit facilities of the 44-inch slabbing mill have been improved by addition of four new pits.

Wartime products of the Gary steelworks are the same as for peacetime, although their utilization is significantly different, virtually all of the output being channeled into military and naval items, and essential civilian goods.

As a result of extensive tests made more than a year ago under direction of the Army, the entire steelworks can be blacked out at night and protected by smoke screens in daylight, should an air raid occur.

The Gary sheet and tin mills have the distinction of being the largest in the world. They adjoin the steelworks and occupy 400 acres, with more than 110 acres under roof.

Construction of the sheet mill began March 9, 1910, and by June 1, 1911, the first production unit was placed in operation. In January, 1916, construction of a new tin mill was begun, and the first tin plate was rolled in October of the same year. Slabs to be rolled in both the sheet and tin mills are delivered from the corporation's Gary Works and South Chicago plant.

The 80-inch hot strip mill, one of the principal production units of the sheet mill, was converted to a heavy plate rolling mill early last year, and has been rolling for maritime uses since that time.

Principal operating units are the 80-inch hot strip mill, 42-inch hot strip

Newsmen, Army and Navy officials visiting the Gary works were impressed by the number of women at work there, and the variety of their jobs. This girl is operating torches which cut steel plate for use in construction of tanks

Operating punch press in Gary Steelworks. Discs are pressed into 75-millimeter shells

facilities in Illinois at a cost of $200,000, mill, electrolytic tinning line, bonderizing line, hot-dipped tin plate department, and cold-reduction department for sheet and tin plate, with auxiliary equipment for temper rolling and shearing.

Wartime products include heavy plate for tanks, landing mats, deck plates, trucks and maritime uses; steel for cartridge cases, storage tanks, bombs, helmets; terne plate for ammunition cases and food ration containers; and corrosion-resistant black plate for food containers, made without use of tin.

The Gary plant of American Bridge Co. is a structural fabricating shop built in 1911. It occupies 150 acres and has 800,000 square feet under roof. For the past 18 months, this plant has been operating at 100 per cent capacity, its principal facilities being punching, shearing, cutting, bending, forging, riveting, electric welding and machine shop.

Wartime operations include cutting and inspection of steel cartridge case disks for ordnance, 20, 37, 40, and 75-millimeter types; subassembly of torpedo bulkheads; flight deck bents; marine engine beds and smaller Army and Navy materiel.

Incidentally, some of the Gary plant's facilities, not recently or currently in use, have been dismantled and moved to Ambridge, Pa., to enable the company to expedite construction of its tank landing boat plant there.

Impressive during the inspection trip was the number of women now employed in work which, prior to the war, was regarded as exclusively for men. This applies particularly to the steelworks; the tin mill always has employed many women, particularly in inspection and sorting departments. The influx of women is continuing.

As a matter of fact, Gary is in a critical labor area and announcement was made by WMC on March 18 that effective May 1 the entire Calumet district will be placed in Group I, which makes the 48-hour week mandatory. This includes Gary, and adjacent steelmaking cities. However, most plants in this area have been exceeding or closely approaching 48 hours for a considerable period.

NEW FACILITIES...

Additional Expansions, Equipment Authorized

Defense Plant Corp. has approved the following contracts for new war plant facilities and equipment purchases. In each case, DPC will retain title to the properties. Figures are approximate. Contracts include:

Ampco Metal Inc., Milwaukee, to provide equipment for a plant in Wisconsin, at a cost of $320,000.

Harris-Seybold-Potter Co., Cleveland, to provide equipment for a plant in Ohio costing $150,000.

Gary Shapira, et al., Bardstown, Ky., to provide equipment at a plant in Kentucky at a cost of $15,000.

Sundstrand Machine Tool Co., Rockford, Ill., to provide additional plant facilities in Illinois at a cost of $200,000, resulting in an overall commitment of $430,000.

Curtiss-Wright Corp., Buffalo, to provide additional plant facilities in Missouri, at a cost of $825,000, resulting in an overall commitment of $23,750,000.

Curtiss-Wright Corp., Buffalo, to provide additional plant facilities in New York at a cost of $13,000,000, resulting in an overall commitment of $48,000,000.

Curtiss-Wright Corp., Buffalo, to provide additional plant facilities at a plant in New York at a cost of $1,000,000, resulting in an overall commitment of $5,300,000.

Douglas Aircraft Co. Inc., Santa Monica, Calif., to provide additional facilities at a plant in California at a cost of $90,000, resulting in an overall commitment for $725,000.

Ohio Crankshaft Inc., Cleveland, to provide additional equipment for a plant in Ohio at a cost of $875,000, resulting in an overall commitment of $8,900,000.

White-Rodgers Electric Co., St. Louis, to provide additional equipment for a plant in Missouri costing $150,000.

Western Gear Works, Seattle, to provide additional facilities for a plant in Washington at a cost of $425,000.

Standard Oil Co., of Louisiana, Baton Rouge, La., to provide facilities for a plant in Louisiana at a cost of $500,000.

Howard Foundry Co., Chicago, to provide additional plant facilities for a plant in Illinois at a cost of $965,000, resulting in an overall commitment of $2,500,000.

General Motors Corp., Detroit, to provide additional plant facilities for a plant in Michigan at a cost of $1,350,000 resulting in an overall commitment of $1,750,000.

Bureau of Mines Sets Up New Laboratory at Albany, Oreg.

Albany, Oreg., has been selected as the site for the Northwest electro-development laboratory where Bureau of Mines metallurgists will study the recovery and processing of minerals from the Pacific Northwest as part of a program to utilize this region's resources in winning the war, it is announced by Secretary of the Interior Harold L. Ickes.

Negotiations have been completed for the purpose of the vacated buildings and grounds of the Lewis and Clark College, an institution that moved to Portland a few years ago, Secretary Ickes said, and the Bureau of Mines soon will begin converting the property into a laboratory.

Commodity Index Rises; Controls in Difficulty

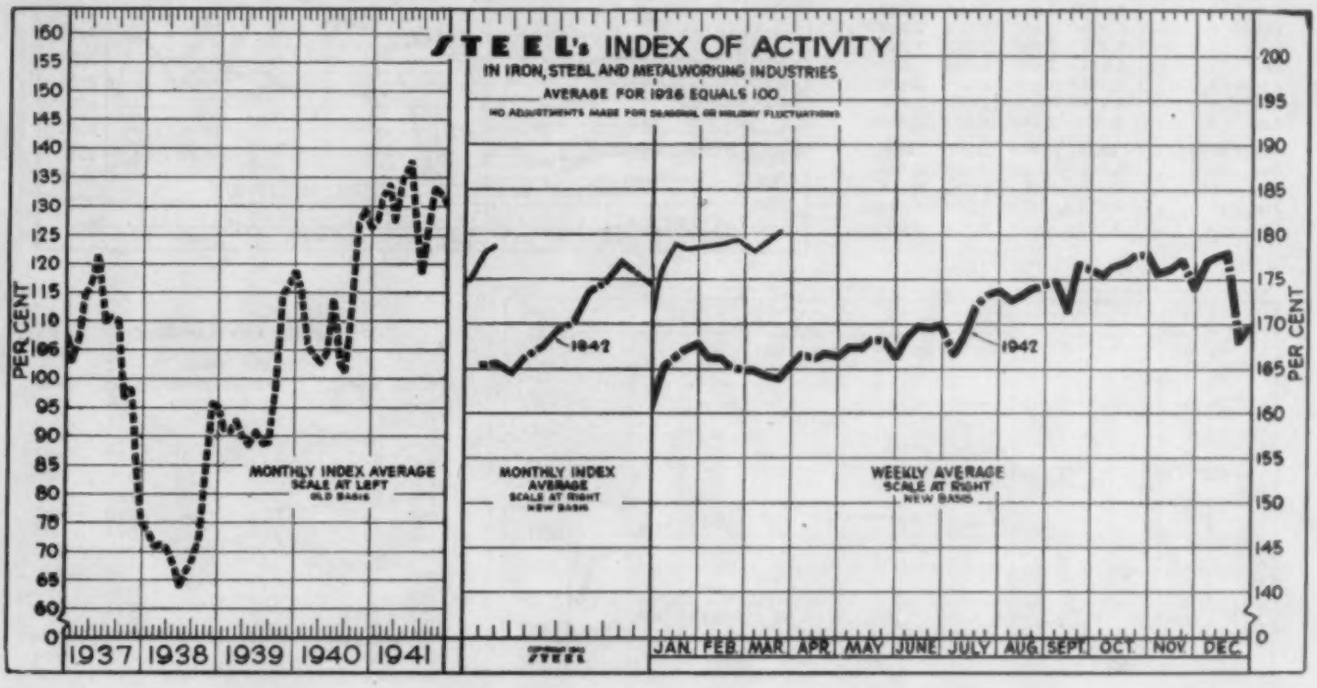
COMMODITY markets are in confusion as a result of too sharp restrictions on some lines and ineffective control of black markets in others. The public's pre-rationing rush to buy goods likely to be limited, plus an unprecedented ability to spend for present and future needs, has brought on progressive maldistribution and real scarcities.

Although drastic taxation is expected to absorb much excess individual income, earnings continue to grow with the increase in war expenditures and thus far constitute the most serious threat to stabilization through price control. Limited production, lend-lease commitments and overbuying at home combined to create the condition which inspired a recent Senate charge that distribution of essential civilian goods and services were on the point of breaking down.

The tax program, main support of price and consumption controls, is regarded in some quarters as the chief reason for OPA's growing reliance on a flexible price policy.

U. S. Bureau of Labor's wholesale price index of 889 commodities fluctuated only five points between 75.0 and 80.9 from January, 1938 to January, 1941. In the last two years it has progressed steadily upward to 101.9 in January, 1943, a gain of 21 points. There is good reason to believe it will go higher as pressure grows.

Higher rate of industrial activity in the latest period caused STEEL's index to rise 1.2 points to 180.2. Most indicators moved upward. Steel production, calculated on the basis of greater capacity now in use, swung back to the peak rate of 99.5 per cent. Freight carloadings gained substantially, while electric power output gained 2,157,000 kilowatt hours over the 3,944,679,000 k.w.h. distributed in the week ending March 13.


STEEL's INDEX OF ACTIVITY
IN IRON, STEEL AND METALWORKING INDUSTRIES
AVERAGE FOR 1936 EQUALS 100
NO ADJUSTMENTS MADE FOR SEASONAL OR HOLIDAY FLUCTUATIONS
PER CENT
MONTHLY INDEX AVERAGE SCALE AT LEFT OLD BASIS
MONTHLY INDEX AVERAGE SCALE AT RIGHT NEW BASIS
WEEKLY AVERAGE SCALE AT RIGHT NEW BASIS
1942
1942
1937
1938
1939
1940
1941
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.

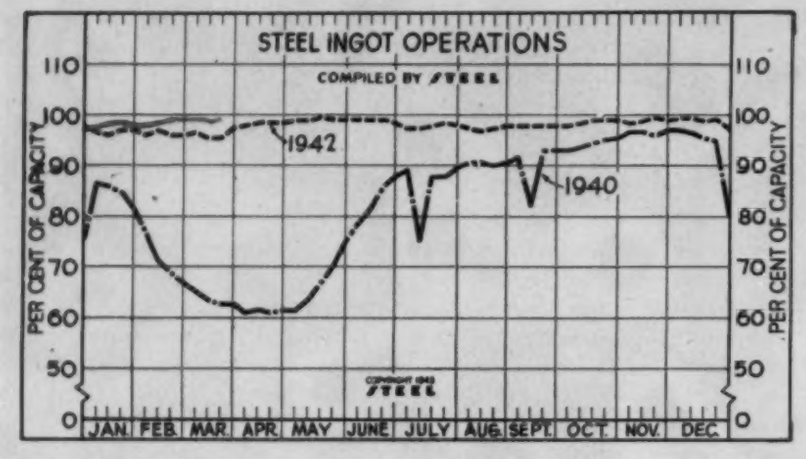
STEEL'S index of activity climbed 1.2 points to 180.2 in the week ending Mar. 20:

Week Ended	1943	1942
Mar. 20	180.2†	163.9
Mar. 13	179.0	164.1
Mar. 6	178.2	164.8
Feb. 27	178.9	165.0
Feb. 20	179.0	165.1
Feb. 13	178.8	166.2
Feb. 6	178.6	166.3
Jan. 30	178.6	167.9
Jan. 23	178.1	167.4
Jan. 16	178.9	166.6
Jan. 9	176.7	165.6

†Preliminary.

Mo. Data	1943	1942	1941	1940	1939	1938	1937	1936	1935	1934	1933	1932
Jan.	178.1	165.7	127.3	114.7	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6
Feb.	178.8	165.6	132.3	105.8	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3
March		164.6	133.9	104.1	92.6	71.2	114.4	87.7	83.1	78.9	44.5	54.2
April		166.7	127.2	102.7	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8
May		167.7	134.8	104.6	83.4	67.4	121.7	101.8	81.8	83.7	63.5	54.8
June		169.4	138.7	114.1	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4
July		171.0	128.7	102.4	83.5	66.2	110.4	100.1	75.3	63.7	77.1	47.1
Aug.		173.5	118.1	101.1	83.9	68.7	110.0	97.1	76.7	63.0	74.1	45.0
Sept.		174.8	126.4	113.5	98.0	72.5	96.8	86.7	69.7	56.9	68.0	46.5
Oct.		176.9	133.1	127.8	114.9	83.6	98.1	94.8	77.0	56.4	63.1	48.4
Nov.		175.8	132.2	129.5	116.2	95.9	84.1	106.4	88.1	54.9	52.8	47.5
Dec.		174.1	130.2	126.3	118.9	95.1	74.7	107.6	88.2	58.9	54.0	46.2

Note: Weekly and monthly indexes for 1942 and 1943 have been adjusted to offset the forced curtailment in automobile production and to more accurately reflect expanding steel production



Steel Ingot Operations

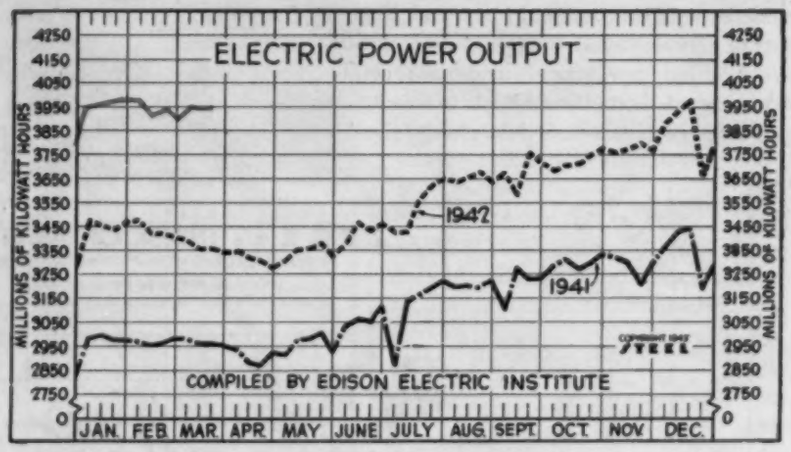
(Per Cent)

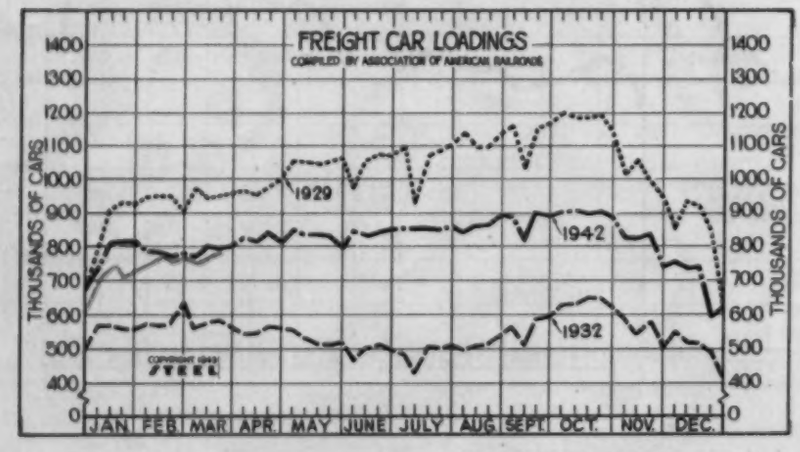
Week ended	1943	1942	1941	1940
Mar. 20	99.5	95.5	99.5	62.5
Mar. 13	99.0	95.5	98.5	62.5
Mar. 6	99.5	96.5	97.5	63.5
Feb. 27	99.5	96.0	96.5	65.5
Feb. 20	99.5	96.0	94.5	67.0
Feb. 13	99.0	97.0	96.5	69.0
Feb. 6	98.5	96.0	97.0	71.0
Jan. 30	98.5	97.0	97.0	76.5
Jan. 23	99.0	97.0	95.5	81.5
Jan. 16	99.0	96.0	94.5	84.5
Jan. 9	97.5	96.5	93.0	86.0
Jan. 2	97.5	97.5	92.5	86.5
Week ended	**1942**	**1941**	**1940**	**1939**
Dec. 26	99.0	93.5	80.0	75.5
Dec. 19	99.0	97.5	95.0	90.5
Dec. 12	99.5	97.5	95.5	92.5

Electric Power Output

(Million KWH)

Week ended	1943	1942	1941	1940
Mar. 20	3,947	3,357	2,809	2,424
Mar. 13	3,945	3,357	2,818	2,460
Mar. 6	3,946	3,392	2,835	2,464
Feb. 27	3,893	3,410	2,825	2,479
Feb. 20	3,949	3,424	2,820	2,455
Feb. 13	3,939	3,422	2,810	2,476
Feb. 6	3,960	3,475	2,824	2,523
Jan. 30	3,977	3,468	2,830	2,541
Jan. 23	3,974	3,440	2,980	2,661
Jan. 16	3,952	3,450	2,996	2,674
Jan. 9	3,953	3,473	2,985	2,688
Jan. 2	3,780	3,289	2,831	2,558
Week ended	**1942**	**1941**	**1940**	**1939**
Dec. 26	3,656	3,234	2,757	2,465
Dec. 19	3,976	3,449	3,052	2,712
Dec. 12	3,938	3,431	3,004	2,674
Dec. 5	3,884	3,368	2,976	2,654


ELECTRIC POWER OUTPUT
MILLIONS OF KILOWATT HOURS
1942
1941
COMPILED BY EDISON ELECTRIC INSTITUTE
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.



Freight Car Loadings

(1000 Cars)

Week ended	1943	1942	1941	1940
Mar. 20	781†	797	768	620
Mar. 13	769	799	758	619
Mar. 6	748	771	742	621
Feb. 27	783	781	757	634
Feb. 20	752	775	678	595
Feb. 13	765	783	721	608
Feb. 6	755	784	710	627
Jan. 30	735	816	714	657
Jan. 23	709	818	711	649
Jan. 16	755	811	703	646
Jan. 9	716	737	712	668
Jan. 2	621	674	614	592
Week ended	**1942**	**1941**	**1940**	**1939**
Dec. 26	592	607	545	550
Dec. 19	743	799	700	655

†Preliminary.

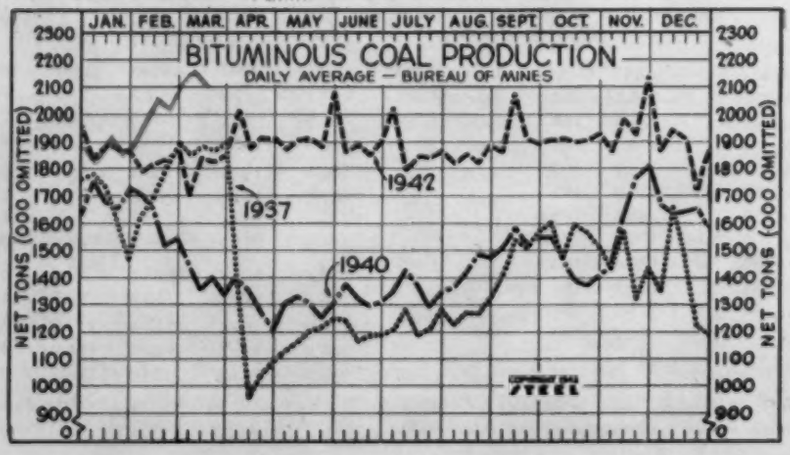
Bituminous Coal Production

Daily Average

Net Tons (000 omitted)

Week ended	1943	1942	1941	1937
Mar. 13	2,093†	1,842	1,844	1,883
Mar. 6	2,125	1,693	1,791	1,851
Feb. 27	2,113	1,878	1,736	1,897
Feb. 20	2,027	1,833	1,736	1,807
Feb. 13	2,033	1,817	1,736	1,696
Feb. 6	1,980	1,793	1,683	1,634
Jan. 30	1,900	1,866	1,684	1,466
Jan. 23	1,867	1,886	1,656	1,605
Jan. 16	1,929	1,883	1,609	1,731
Jan. 9	1,883	1,842	1,691	1,780
Jan. 2	1,860	1,960	1,762	1,764
Dec. 26	1,714	1,632	1,591	1,230

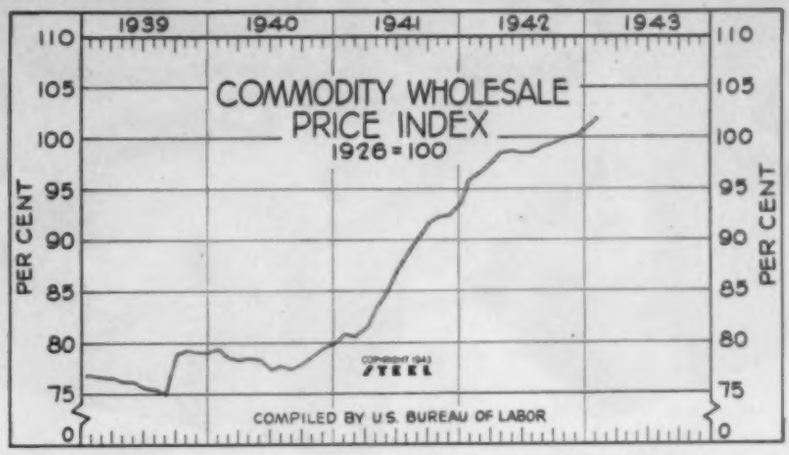
†Preliminary.

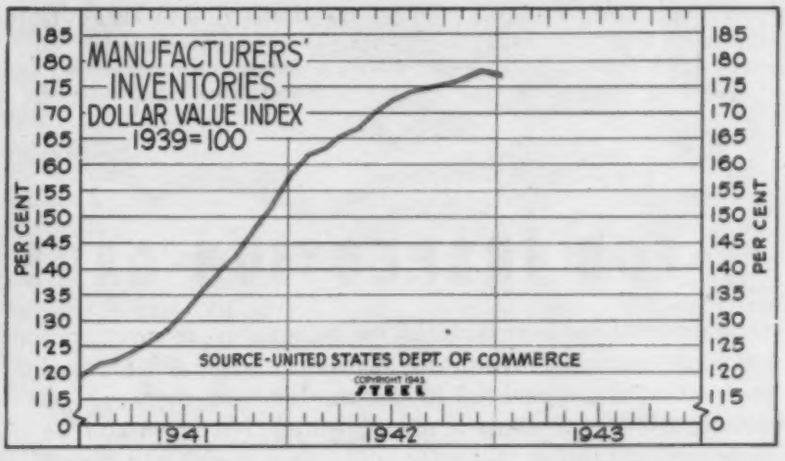

BITUMINOUS COAL PRODUCTION
DAILY AVERAGE — BUREAU OF MINES
NET TONS (000 OMITTED)
1942
1937
1940
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.

All Commodity Wholesale Price Index
U. S. Bureau of Labor

(1926 = 100)

	1943	1942	1941	1940	1939
Jan.	101.9	96.0	80.8	79.4	76.9
Feb.	....	96.7	80.6	78.7	76.9
March	....	97.6	81.5	78.4	76.7
April	....	98.7	83.2	78.6	76.2
May	....	98.8	84.9	78.4	76.2
June	....	98.6	87.1	77.5	75.6
July	....	98.6	88.8	77.7	75.4
Aug.	....	99.2	90.3	77.4	75.0
Sept.	....	99.6	91.8	78.0	79.1
Oct.	....	100.0	92.4	78.7	79.4
Nov.	....	100.3	92.5	79.6	79.2
Dec.	....	100.7	93.6	80.0	79.2
Ave.	....	98.7	87.3	78.5	77.1





Manufacturers' Inventories
Dollar Value Index

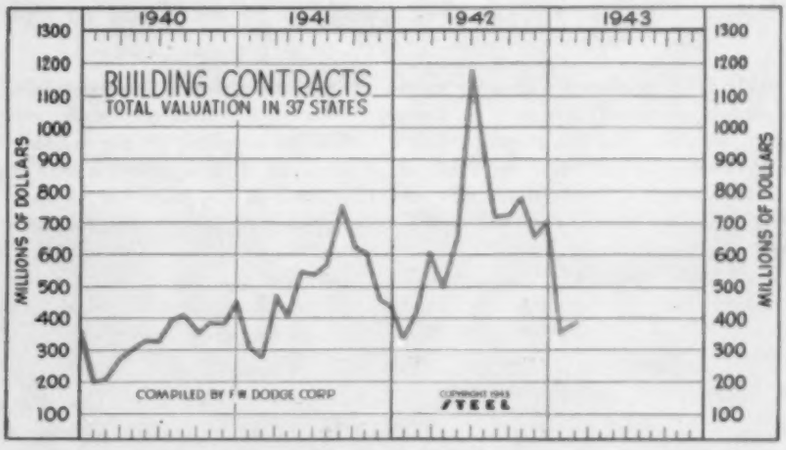
1939 = 100

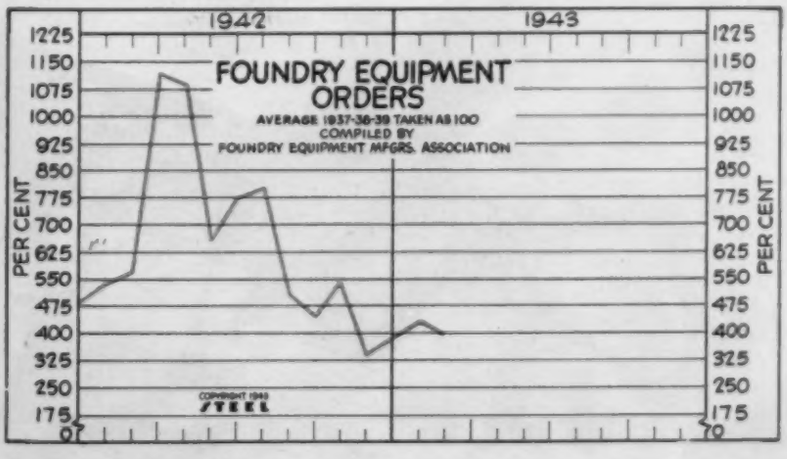
	1942	1941	1940	1939
Jan.	161.9	121.8	109.5	100.9
Feb.	163.0	122.7	110.6	100.4
March	165.6	124.1	110.5	99.5
April	167.0	126.0	110.0	98.5
May	170.4	128.7	110.5	97.9
June	172.9	132.0	110.6	97.4
July	174.2	136.4	112.2	98.1
Aug.	175.0	140.0	113.3	98.8
Sept.	175.4	143.4	114.1	98.9
Oct.	176.4	148.3	116.2	101.3
Nov.	177.9	152.7	117.7	104.5
Dec.	177.6	158.5	119.9	107.2
Mo. Ave.	171.4	136.2	113.0	100.3

Construction Total Valuation
In 37 States

(Unit: $1,000,000)

	1943	1942	1941	1940	1939
Jan.	$350.6	$316.8	$305.2	$196.2	$251.7
Feb.	393.5	433.6	270.4	200.6	220.2
Mar.	....	610.8	479.9	272.2	300.7
April	....	498.7	406.7	300.5	330.0
May	....	673.5	548.7	328.9	308.5
June	....	1190.3	539.1	324.7	288.3
July	....	943.8	577.4	398.7	299.9
Aug.	....	721.0	760.3	414.9	312.3
Sept.	....	723.2	623.3	347.7	323.2
Oct.	....	780.4	606.3	383.1	261.8
Nov.	....	654.2	458.6	380.3	299.8
Dec.	....	708.7	431.6	456.2	354.1
Ave.	....	$687.9	$500.6	$333.7	$295.9





Foundry Equipment Orders

Monthly Average

(1937-38-39 equals 100)

	1943	1942	1941	1940
Jan.	429.8	532.7	285.3	149.0
Feb.	399.5	567.9	281.1	135.7
March	....	1122.4	315.2	183.2
April	....	1033.8	377.2	145.2
May	....	653.6	298.7	129.1
June	....	774.0	281.1	164.9
July	....	800.8	358.1	194.4
Aug.	....	510.8	312.9	165.4
Sept.	....	446.4	363.8	161.2
Oct.	....	540.6	403.8	264.0
Nov.	....	338.8	408.5	254.2
Dec.	....	382.5	481.2	257.8
Year	....	646.7	345.6	184.0

By Colonel H. B. HAMBLETON
Chief, Gage Section
Office of Chief of Ordnance
United States War Department

Glass FOR INSPECTION GAGES

Glass has many advantages as a material for gages: Low thermal conductivity; low cost; high corrosion resistance; the ability to match thermal expansion and contraction characteristics to the steel it is to check. High frangibility obviates possibility of using a sprung gage. No burrs can be raised to throw gage off calibration. Greater lightness and visibility permit gaging speeds to be increased as much as 50 per cent

AMERICA is blessed with a far greater supply of natural resources than any other country. Yet the present conflict is so colossal in size that there exists an actual shortage of many of the raw materials needed to carry it on. Therefore the Ordnance Department of the United States Army, which produces the fighting weapons of the American soldier, undertook an extensive program to substitute abundant materials for hard to get materials wherever possible.

One of the more spectacular and possibly far reaching of the contemplated conservation substitutions is that of glass for steel in the hundreds of thousands of precision gages used in the inspection of ordnance items. This program is of particular importance now as the material used in gages is critical tool steel —a steel vitally needed elsewhere in the war effort.

While glass gages are already in use, they are still in the experimental stage. However, their practicability has been determined by more than six months' use at Frankford arsenal and elsewhere. A number of types have been accepted as standard by the Gage Section of the Ordnance Department. Before the ultimate in glass gages has been reached, there is little doubt but that a large portion of the standard plain gages used

These typical glass gages have already replaced those of steel at Frankford arsenal and other places. Such gages can save 250 tons of critical tool steel annually in government arsenals alone.
OWI photo by Palmer

Plain plug gage made of glass is shown here being used to check inside diameter of a metal part at Frankford arsenal. Such gages are lighter and cheaper than steel, are not subject to corrosion, nor to thermal changes. And they cannot acquire burrs that would change their effective size. OWI photo by Palmer

will be made of this material. Far from being a temporary war expedient, glass gages have so many advantages over steel gages that they are here to stay, it is firmly believed. There is no doubt but that they will become a permanent fixture in the industrial world.

One of the first characteristics that attracted the attention of ordnance gage engineers to glass was its extremely low thermal conductivity. They had been troubled occasionally by undue expansion of gages from the heat of the operator's fingers. Thus when glass was suggested as a possible substitute for steel, it was this factor of low thermal conductivity that first interested them. Experiments showed conclusively that heat transferred from the hands to glass gages does not affect the gaging dimensions.

Furthermore steels from which gages are made have a definite coefficient of expansion amounting to 0.000006-inch per inch per 1 degree Fahr. while the parts to be gaged may have various coefficients of expansion. On the other hand, glass for gages can be made to have almost any desired expansion coefficient, thus gages can be built to have same expansion as the material they are to test eliminating thermal expansion and contraction as a gaging variable.

Another characteristic of considerable value is that the lower the coefficient of expansion of glass, the greater is its hardness and stability against chemical attack or weathering in a damp climate. Glass which has been found to have a satisfactory coefficient of thermal expansion has the following incidental characteristics: A softening point of 610 degrees Fahr.; an annealing point of 430 degrees Fahr.; a strain point of 400 degrees Fahr. It has also been ascertained that very little lead oxide should be used in glass for gages as it tends to soften the gage.

There are four types of gages that are now standard in the Ordnance Department. They are (1) plug gages of ¼-inch and more in diameter, including plain plugs, double-end plain plugs and go-and-not-go gages; (2) ring gages of the go-and-not-go, plain twin and combination ring and snap types; (3) snap gages; (4) profile and position gages.

There is little doubt but that there will also be included certain types of flush pin gages with pins in excess of ⅜-inch as well as chamber gages for measuring the profile of a part such as a cartridge case, for instance. If this idea proves out as anticipated, chamber gage practice will be revolutionized. While thread gages of glass are considered impracticable at this time, it might be possible to mold coarse threaded sections of this material.

At the present time the Ordnance Department is considering gages or gage blanks made from either lime glass, boro-silicate (Pyrex) glass or a light flint glass. However, it does not hold rigidly to the above types but will accept gages of glass of different composition if full and sufficient evidence is provided that such proposed gages are equal in all respects to the gages covered by its specifications. See proposed draft of tentative glass gage specifications, Table I.

Maximum hardness, maximum abrasion resistance and dimensional stability

(*Please turn to Page* 110)

Glass gage being used to check inside diameter of a cartridge case at Frankford arsenal. Lightness and better visibility have increased gaging speeds as much as 50 per cent. OWI photo by Hollem

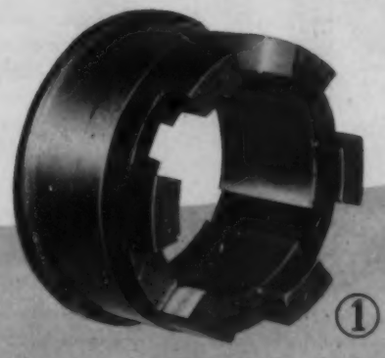
For other articles in this series of user reports and for information on development of NE steels, listings of War Department steels, Aeronautical Material Specification steels and the like, see references on p. 78.

User Report No. 12

On Experience with . . . .

NE (National Emergency) ALLOY STEELS

By J. SORENSON
Metallurgist
Four Wheel Drive Auto Co.
Clintonville, Wisc.



①

SINCE Pearl Harbor, we have conducted laboratory investigations to determine the suitability of NE-8739 and 8744 steels for use as alternate steels to replace SAE-3130, 3135, 3140, 3145 and 4640 which are used in moderately stressed heavy duty truck parts. Table I shows some of the average laboratory results obtained with fine-grained NE-8739 steel.

From this data it can be readily observed why the NE-steels should be gaining favor in many applications where higher alloy steels were formerly used.

To further illustrate as a matter of comparison of physical properties between NE-8739, NE-8744 and SAE-3140 alloy steels, the average physical properties shown in Table II illustrate that the NE steels compare very favorably.

In regard to the relative machinability values of these materials, our laboratory tests as well as actual shop production experience over a period of several months time indicate that these values are similar. No great discrepancy seems to exist in relative machinability values between NE-8739, NE-8744 and SAE-3140.

Likewise, the carburizing grades of the NE steels such as NE-8620 have been used with good results as substitutes for SAE-3120 and SAE-3115. Where exceptionally high unit stresses are encountered requiring such material as SAE-2515 steel, we have found these materials can be replaced very readily with SAE-4815 steel, thus making a decided saving on the amount of nickel used. A comparison of average physical properties on several actual tests made in the laboratory on these materials is given in Table III.

These results have also been supplemented with the observation of these materials subjected to severe service in the field. These in turn have confirmed the laboratory results.

Also, from laboratory machinability tests supplemented by actual shop production records, the SAE-4815 steel was found to show a very decided improvement in relative machinability values over SAE-2515. As shown in Table IV, relative machinability test comparison revealed a speed increase of 22 surface feet per minute was possible when machining SAE-4815.

This relative machinability test was conducted on an 18-inch engine lathe, with 7/16-inch high-speed steel tool bits, no coolant used. The materials were SAE-4815, brinell 207; and SAE-2515, brinell 187. Both materials were hot rolled, annealed. The same feeds and depth of cuts were used on both materials, an attempt being made to obtain the most practical operating speed.

In the interest of further conservation of nickel and chromium in heavy duty truck construction, considerable research has been carried on with various steel casting alloy compositions of manganese and molybdenum. As a result, we have been able to eliminate entirely the use of chromium and nickel from all of our alloy steel castings and thus promoting further saving of strategic materials.

The comparison in Table V of average physical properties between the chromium-nickel steel castings formerly used and the manganese-molybdenum steel castings now used will illustrate the possibility of using the manganese-molyb-

TABLE I—Tests on NE-8739, Test Piece 0.530-Inch

Specimen Group	T.S. in lbs. per sq. in.	Y.P. in lbs. per sq. in.	% Elong. in 2 in.	% Red. of Area	Brinell Hardness	Heat Treatment
A-2	230,000	210,000	11.0	39.8	477	1525° F. oil quench. Draw 600° F.
A-5	215,000	205,000	11.5	44.3	460	1525° F. oil quench. Draw 700° F.
A-12	205,000	186,000	12.0	48	444	1525° F. oil quench. Draw 800° F.
A-14	185,000	170,000	14.0	49	402	1525° F. oil quench. Draw 900° F.
A-17	165,000	150,000	16.0	53	375	1525° F. oil quench. Draw 1000° F.
A-20	150,000	135,000	17.0	55	311	1525° F. oil quench. Draw 1100° F.
A-24	125,000	110,000	20.0	58	277	1525° F. oil quench. Draw 1200° F.

TABLE II—Physical Properties Comparison, Treated 1-Inch Round

Material Spec.	T.S. in lbs. per sq. in.	Y.P. in lbs. per sq. in.	% Elong. in 2 in.	% Red. of Area	BHN	Izod ft. lbs.
NE-8739	125,000	110,000	20	55	277	60
NE-8744	130,000	115,000	20	52	273	55
SAE-3140	130,000	118,000	21	58	273	55

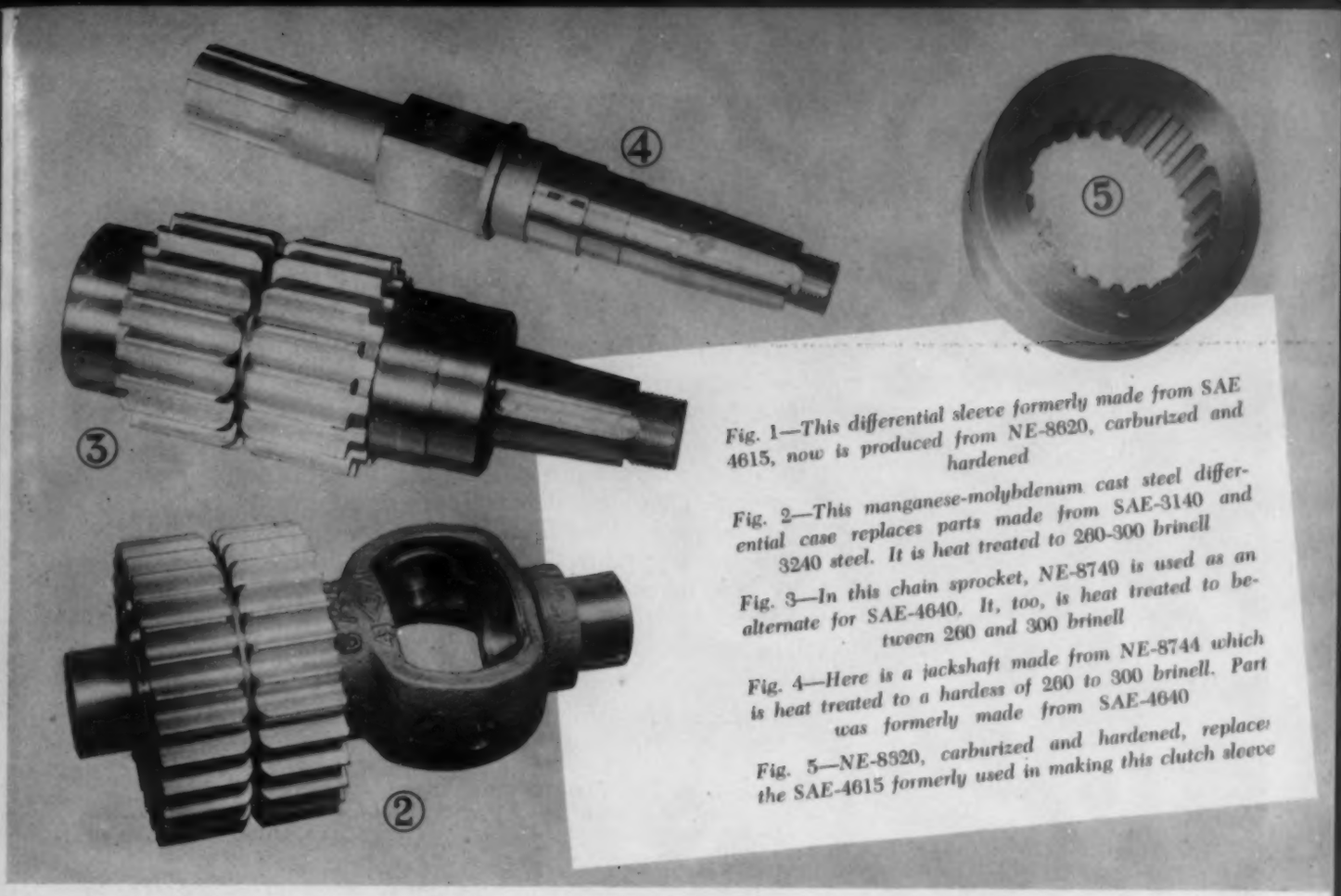


Fig. 1—This differential sleeve formerly made from SAE 4615, now is produced from NE-8620, carburized and hardened

Fig. 2—This manganese-molybdenum cast steel differential case replaces parts made from SAE-3140 and 3240 steel. It is heat treated to 260-300 brinell

Fig. 3—In this chain sprocket, NE-8749 is used as an alternate for SAE-4640. It, too, is heat treated to between 260 and 300 brinell

Fig. 4—Here is a jackshaft made from NE-8744 which is heat treated to a hardess of 260 to 300 brinell. Part was formerly made from SAE-4640

Fig. 5—NE-8320, carburized and hardened, replaces the SAE-4615 formerly used in making this clutch sleeve

denum steel casting composition as an alternate for the chromium-nickel alloy which is so difficult to obtain.

Likewise, service records from the field have also verified the use of manganese-molybdenum steel castings as a suitable alternate for the chromium-nickel steel castings.

TABLE III—Core Properties, Pseudo Carburized at 1675 degrees Fahr.

Spec.	T.S. lbs. per sq. in.	Y.P. lbs. per sq. in.	Mater ila % Red. of Area	% Elong. in 2 in.	Izod ft. lbs.	———Remarks———
SAE-2515	165,000	140,000	55	16	50	Reheat 1500° F. Oil Quench. Draw 300° F.
SAE-4815	160,000	140,000	55	17	45	Reheat 1500° F. Oil Quench. Draw 300° F.

TABLE IV—Machinability Test

Material	Depth of Cut	Feed per Rev.	S.F.M.
SAE-2315	⅛	.0265	72
SAE-4815	⅛	.0265	90
SAE-2515	¼	.0115	72
SAE-4815	¼	.0115	90

TABLE V—Physical Property Comparison

	Analy-sis, %	T.S. in lbs. per sq. in.	Y.P. in lbs. per sq. in	% Elong. in 2 in.	% Red. of Area	BHN	——Remarks——
Manganese-Molybdenum Steel Castings, Average Results							
Carbon	0.35	90,000	60,000	20	35	187	Normalized and tempered 1100° F.
Manganese	1.25						
Molybdenum	0.30						
Chromium-Nickel Steel Castings, Average Results							
Carbon	0.34	95,000	62,000	21	38	202	Normalized and tempered 1100° F.
Manganese	0.50						
Chromium	0.72						
Nickel	1.40						

In regard to the relative machinability values, our laboratory tests as well as shop experience have shown that the manganese-molybdenum steel castings can be machined at the same rate as the chromium-nickel steel castings in all of the various general machining operations.

In some of the special machining operations, the manganese-molybdenum steel castings have shown increased production over that obtained with chromium-nickel material.

It must not be inferred that the alloys of chromium and nickel are no longer essential in the production of alloy steel castings. The fact is that there are many applications where these critical alloys are essential, especially is this true when high impact stresses are encountered at extremely low temperatures.

However, other users of alloy steel castings may have problems similar to those we have experienced. Thus our experience may be of practical interest to other users of alloy steel castings. In such instances the above mentioned data is intended to be used as a guide rather than absolute values as to what may be accomplished. Thus it may help others to economize in the use of strategic materials such as chromium and nickel and thus aid our country in materially promoting the war effort by making best use of the materials available.

straightening

HEAT-TREATED PARTS

This is Section II in a series of four articles on methods of controlling and correcting the distortion that occurs in heat treating certain types of parts. Section I on oil-hardening steels appeared in STEEL, March 15, p. 114. Section II covers carburizing steels

★

By G. B. BERLIEN
Chief Metallurgist
Lindberg Steel Treating Co.
Chicago

CARBURIZING steels are becoming increasingly important to the machine industry. Their application is so general and varied that nearly every steel user has an occasion to employ them at one time or another. The wide variety of SAE analyses of low carbon content give us carburizing steels in both water and oil-hardening categories. We find that these steels are subject to warping just as are tool steels. However, methods of bringing them back to shape may differ.

Core hardness of carburizing steels is an important factor in straightening because if core hardness is too high the part will not take a set but will either spring back to its distorted shape when pressure is released, or else break. If the parts are of such shape, therefore, that they tend to distort on quenching, avoid quenching from the box at carburizing temperatures of 1650 to 1700 degrees Fahr. as this generally results in excessive size change and distortion. And because those temperatures are in the range to harden low-carbon cores, the combination of a distorted part and a hardened core should be avoided.

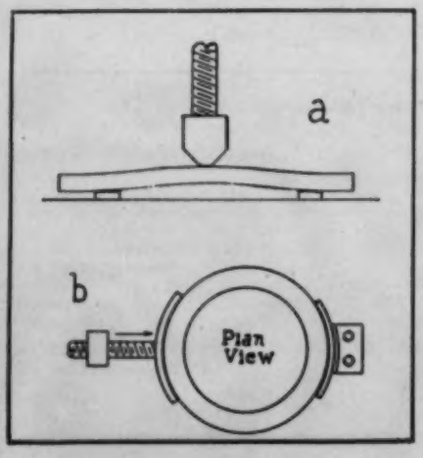
One way to get around this is to drop the temperature of the carburizing box to 1500 degrees Fahr. after carburizing, and then quench from the box. This will definitely reduce the amount of warp which would be encountered from the higher quenching temperature.

For the average job, full cooling in the box is best. However, if this is done, normalizing before straightening is extremely important. Even the most innocent looking part has been known to snap when pressure is applied in the as-carburized condition. Therefore the first rule on carburized and pot cooled parts should be always normalize before straightening.

Most of the low-carbon carburizing steels can be straightened cold. A method preferred to quenching at 1500 degrees Fahr. after dropping from the carburizing heat is as follows: Allow the parts to cool in the box from the carburizing temperature. Then normalize by reheating in open fire to approximately 1550 degrees Fahr. to refine the core grain size. Allow to air cool. This will leave the steel softer than the as-carburized and cooled condition.

Then straighten if considerable warp has occurred. If but little warp is noticed straightening while soft can be dispensed with. Then clean the scale from the surface, preferably by sandblasting, so as to avoid soft spots when hardening. The part can be reheated to the proper temperature for hardening the case and then quenched. If the carbon content of the core is 0.25 per cent or less and providing there are no sections carburized all the way through (or where total case thickness does not exceed total core thickness), straightening can be done at room temperature by means of a screw press.

It is advisable to use shims in flattening a ring under a press as at a. When rounding up a ring with a horizontal screw on a straightening bed as at b, flattening of light rings can be prevented by use of blocks that fit the arc of the ring



If the carburizing steel is one of the oil hardening types and the carbon in the core is 0.30 per cent or more, it may be advisable to remove the part from the quench with some heat left in and then straighten it as was suggested for oil-hardening tool steel in Section I of this series. Hardening will continue until the steel has reached room temperature, so care should be exercised when applying pressure.

As an example in handling carburized steels, let us take that old standby SAE-1020 and follow it through the straightening process. Suppose it is a shaft 2 inches in diameter and that we have a carburized case 1/16-inch deep. After cooling in the box it is reheated to 1550 degrees Fahr. to refine the core. The part may be oil quenched or air cooled. If much straightening is to be done, air cooling is preferred.

Then we straighten to somewhere near our tolerance, sandblast to remove scale, reheat to 1450 degrees Fahr. and quench stiff in water. The shaft is then capable of undergoing considerable cold straightening without spalling the case. This straightening is done by applying pressure to the high sections with a press.

Carburized work will take a set much better before drawing, hence drawing should be held off until the part has been straightened. The draw for maximum hardness in our example (SAE-1020 shaft) will be about 350 degrees Fahr. Parts should then be checked for straightness after the draw as the relief of straightening and hardening strains may be accompanied by a change of shape.

Parts which are ring shaped often present a serious problem in straightening. Rings as well as straight sections should, of course, be normalized after carburizing. If found to be out of flat, they can be pressed between plates from the

(*Please turn to Page* 98)

30,000,000 motorists will hold their breath

WE Americans might now be staring grimly at defeat if we had not thrust our industrial economy ten years forward over night. To do it we have drastically cut our own standard of living.

When it is over, when gasoline, tires, and the leisure to use them, are once again available, 30,000,000 motorists will hold their breath. Will look to Detroit for cars wrought of plastics and light alloys, cars that can whisper the miles away on a few cupfuls of fuel. For Americans picture an all-out peace when they finish a total war.

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Today the copper industry is producing only for victory. Copper is not available for anything else. But post-war planners with specific problems in metals are referred directly to the Revere Executive Offices in New York.

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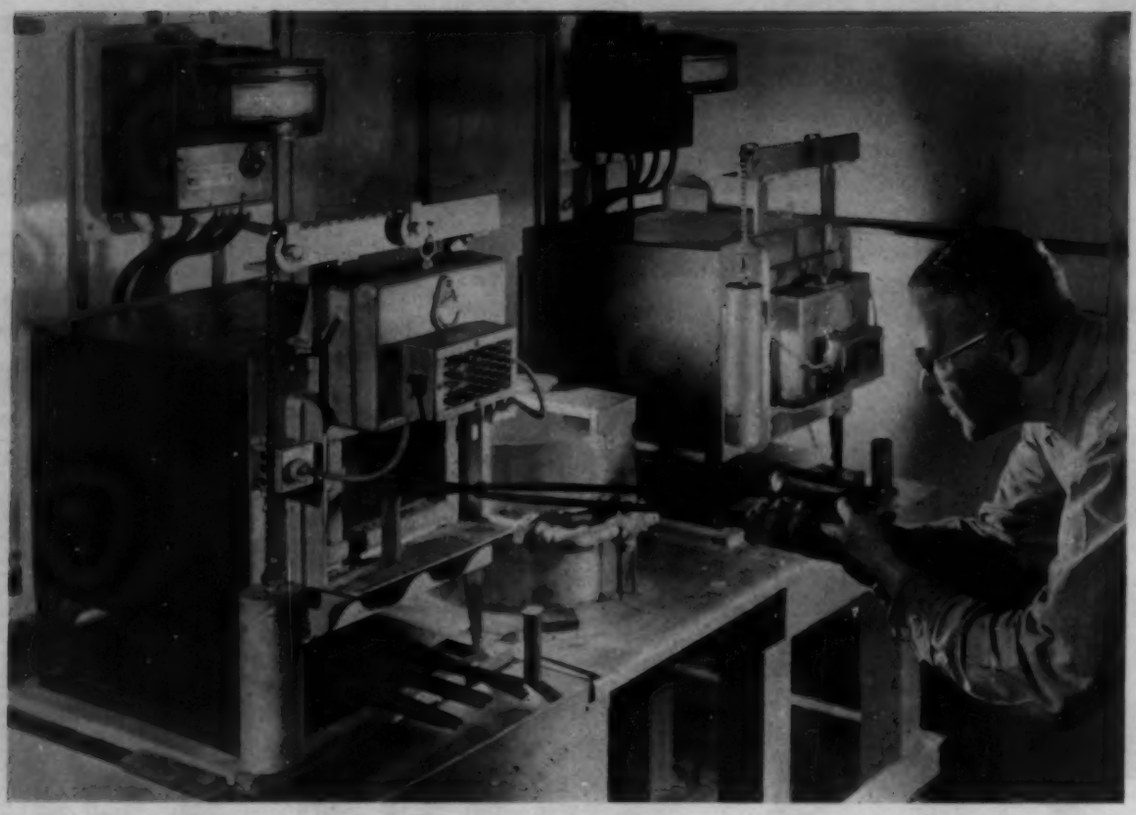

Typical laboratory setup for making Jominy hardenability tests includes high heat and draw furnaces with quenching stand and fixture between them

Facts and Figures for Practical Use of . . .

NE (National Emergency) ALLOY STEELS

IN DEVELOPING the NE alloy steels, the technical committee of the American Iron and Steel Institute had three apparent objectives in mind: Conservation of alloying elements; production of steels capable of satisfactorily replacing the higher alloy compositions; and the establishment of steels which would require only a minimum of change in heat treatment procedure from that used for years on standard alloy analyses. All three objectives seem to have been accomplished.

The NE alloy steels follow the same rules and laws of heat treatment as do any other steels. They may be handled in the same way—by the same methods, machines or equipment—and will develop physical properties which make them suitable to replace the former steels in a majority of applications. Accompanying information and test data were furnished by Joseph T. Ryerson & Son Inc., Chicago. Tables list NE steel physical properties and also indicate the working temperatures for the most popular steels. These data should make it possible for any heat treater to use these steels without difficulty.

But it must be remembered that conditions differ in different shops. The kind of quenching medium used, the temperature of the medium, the efficiency of heat treating equipment in the way of furnaces, coolant circulation, handling apparatus, etc., all have an effect on the results. Each operator, therefore, in first working with NE steels, should make some preliminary experiments before proceeding with any production jobs. In this respect the NE steels do not differ from any other steel which is being tried out for the first time and this caution is no reflection on the adaptability of these steels for most alloy applications.

How To Interpret Jominy Results: It should be noted that the various interpretations of the Jominy end-quench test for the determination of tensile strength, yield point, reduction of area and elongation will apply only to fully quenched steels ranging in quenched hardness from approximately 200 to 400 brinell. These interpretations do not

For information on development of NE steels and their properties, see STEEL, Feb. 9, 1942, p. 70; March 16, p. 72; June 8, p. 66; June 15, p. 66; July 13, p. 80; July 20, p. 86; Aug. 3, p. 70; Aug. 17, p. 40; Aug. 31, p. 41, p. 76; Sept. 7, p. 78; Oct. 19, p. 66; Nov. 9, p. 96; Dec. 28, p. 27; Jan. 25, 1943, p. 84; Feb. 22, p. 102; March 1, p. 94; March 8, p. 90; March 15, p. 94; March 22, p. 78.

For reports from users of NE steels, see Nov. 16, 1942, p. 106; Nov. 23, p. 90; Nov. 30, p. 62; Dec. 7, p. 112; Dec. 14, p. 99; Dec. 21, p. 70; Jan. 11, 1943, p. 60; Jan. 18, p. 66; Feb. 1, p. 100; March 8, p. 109; p. 72 this issue.

For latest revised list of NE ALLOY steels, see March 1, 1943, p. 98.

For list of NE CARBON steels, see March 8, p. 90.

For list of AMS (Aeronautical Material Specification) steels, see Sept. 7, 1942, p. 78.

For details of WD (War Department) steels, and complete listing, see Feb. 8, 1943, p. 80.

From "NE National Emergency Steels. . . . facts and figures for practical use", published by Joseph T. Ryerson & Son Inc., Chicago.

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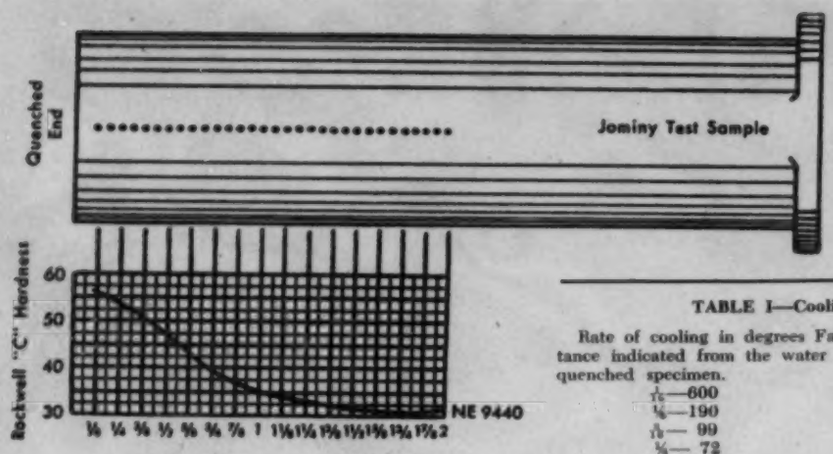

Diagram showing rockwell C hardness readings taken on a standard Jominy end-quench hardenability test specimen to form hardenability chart, lower left

TABLE I—Cooling Rate in Jominy Test

Rate of cooling in degrees Fahr. per second at 1300° F. at the distance indicated from the water cooled end of a standard Jominy end-quenched specimen.

1/16—600	5/16—37	1 —10
1/8—190	7/16—30	1 1/8— 8.5
3/16— 99	1/2—26	1 1/4— 7.2
1/4— 72	9/16—22	1 1/2— 5.5
5/16— 56	5/8—18	2 — 4.3
3/8— 44	7/8—14	

TABLE II—Cooling Rates of Round Bars

Rate of cooling in degrees Fahrenheit at 1300° F. at surface, half-radius and center of different sized rounds—quenched in water and oil

Diameter "D" 1-Inch Round	Surface	Half-Radius	Center
Water Quenched	850	135	100
Oil Quenched	120	53	45
2-Inch Round			
Water Quenched	550	46	32
Oil Quenched	58	24	18
3-Inch Round			
Water Quenched	400	27	15
Oil Quenched	30	12	9
4-Inch Round			
Water Quenched	100	14	8
Oil Quenched	15	6½	5½

TABLE III—Approximate Physical Properties in Relation to Hardness

Rockwell C Hardness	Brinell Hardness	Tensile Strength P.S.I.	Yield Point P.S.I.	Per Cent Elong. in 2"	Per Cent Red. of Area
15	200	95,000/105,000	70,000/ 80,000	22/28	60/68
20	225	106,000/119,000	87,000/100,000	21/26	57/65
24	250	118,000/132,000	102,000/112,000	20/25	55/63
28	275	130,000/145,000	115,000/125,000	18/23	52/61
31	300	142,000/158,000	127,000/135,000	17/21	50/58
34	325	153,000/172,000	137,000/146,000	16/20	47/56
37	350	165,000/185,000	150,000/159,000	14/18	45/54
39	373	176,000/200,000	163,000/172,000	13/16	42/51
42	400	187,000/221,000	175,000/184,000	11/15	40/49

Note:

It must be remembered that these figures are based entirely on hardness and show only the probable physical properties which are usually associated with such hardness. These relationships have been developed by observation of many actual tests. These figures will be reasonably accurate only in the case of fully quenched steels and will be misleading if interpreted to apply to steels of lower than 200 or higher than 400 brinell hardness. In translating Jominy results, this table is apt to be more accurate for alloy steels of 0.30 per cent carbon or higher, because when low carbon steels are involved, the actual yield points will be less than those indicated.

TABLE IV—Approximate Relationship of Drawing Temperature and Tensile Strength

Drawing Temp. Deg. Fahr.	Tensile Strength P.S.I.
400	235,000/290,000
600	210,000/265,000
800	170,000/225,000
1000	125,000/185,000
1200	100,000/150,000

Note:

This table is compiled from averages of a large number of tests conducted on many different alloy steels having a carbon range of from 0.35 to 0.45. These steels were all fully quenched. These figures may be used as an approximate guide for round bars up to about 1½ inches in diameter. No great accuracy is expected in this relationship but these figures may prove useful in determining the drawing temperature to use in an initial test.

TABLE V—Suggested Substitutions

SAE Grades	NE Substitutions
Carburizing Grades	
2320	8720
3120	8620
4023	8022
4119	
4615	
6120	9420
Medium Hardening Grades	
2330	8630
2335	
3130	8735
3135	9430
4037	
4130	
4137	9435
6130	9437
High Hardening Grade	
2340	9442
2345	8739
3140	8744
3145	8442
3150	8749
4140	9445
4150	9537
6150	9542
	9550

Note:

Here are the most popular standard SAE-AISI compositions and the suggested NE (National Emergency) alternates. It is not suggested that the NE steels will in all cases replace the standard alloy steels with complete satisfaction, although they will do so in the majority of cases. As with any new steel, careful tests of alternates are strongly recommended. This is the only way in which definite information on the suitability of a given steel for an application may be obtained.

apply to extremely hard steel; nor to steel which has been heat treated to a hardness below 200 brinell, nor to steel that is annealed, normalized, or in the "as rolled" condition.

The deductions which may be made from the result of a Jominy test are numerous and very useful. Careful laboratory experiments have indicated just how rapidly the Jominy sample cools at different distances from the quenched end. These rates of cooling are shown in Table I.

All heat treaters know that when a relatively large bar is quenched the center will not get as hard as the surface. The reason for this is that the center of such a bar cools more slowly than the surface.

Table II indicates the cooling rate at the surface, half-radium and center of different sized bars when quenched in water and also in oil. These figures were developed by laboratory experiments.

If it is desired to know how hard a certain type of steel will get at the center of a water-quenched 3-inch bar, for example, this may be approximately determined from the Jominy test of the same steel. Table II indicates that a 3-inch round bar, when quenched in water, will cool at the rate of 400 degrees Fahr. per second on the surface, 27 degrees Fahr. per second at the half radius and 15 degrees Fahr. per second at the center.

By referring to Table I, it will be seen that the Jominy test piece cools at 15 degrees Fahr. per second, at approximately ⅜-inch from the quenched end and therefore the hardness of the Jominy sample at this point will be practically

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TABLE VI—Working Temperatures of NE Steels, in Degrees Fahr.

Steel No.	Forging	Normalizing	Annealing	Quenching
Carburizing Grades:				
NE-8020, NE-8620, NE-8720, NE-9420	2000 to 2200	1650 to 1750	1575 to 1625	1550 to 1600
Medium Hardening Grades:				
NE-8630, NE-8735	2000 to 2200	1575 to 1625	1475 to 1525	1500 to 1575
NE-9430	2000 to 2200	1575 to 1675	1475 to 1525	1500 to 1575
NE-9435	2000 to 2200	1575 to 1725	1475 to 1525	1500 to 1575
NE-9437	2000 to 2200	1600 to 1675	1475 to 1525	1500 to 1575
NE-8339	2000 to 2200	1575 to 1625	1475 to 1525	1500 to 1575
High Hardening Grades:				
NE-8442, NE-8739, NE-8744	2000 to 2200	1575 to 1625	1475 to 1525	1500 to 1575
NE-8948, NE-8749	2000 to 2200	1575 to 1625	1450 to 1500	1500 to 1575
NE-9440, NE-9442	2000 to 2200	1600 to 1675	1475 to 1525	1500 to 1575
NE-9445, NE-9450, NE-9540	2000 to 2200	1600 to 1675	1450 to 1500	1500 to 1550

TABLE VII—Physical Properties of CARBURIZING NE Steels

(These are core physicals from 1" rounds, only, pseudo-carburized at 1700° F. for 8 hours, oil quenched as indicated and drawn at 300° F.)

Steel No.	Quench Temp.	Tensile Strength P.S.I.	Yield Point P.S.I.	% Elong. in 2"	% Red. of Area	Brinell Hardness
NE-8020	Cooled in pot. Reheated to 1550° F. and oil quenched	112,525	92,400	22.1	56.3	235
NE-8620	As rolled	91,400	58,375	25.4	59.6	197
NE-8620	Quenched direct from pot at 1700° F.	134,225	108,500	18.2	47.1	302
NE-8620	Cooled in pot. Reheated to 1550° F. and quenched	130,725	102,000	17.6	46.3	285
NE-8720	Cooled in pot. Reheated to 1550° F. and oil quenched	141,875	117,225	17.9	46.9	321
NE-9420	Quenched direct from pot at 1700° F.	126,825	101,750	18.5	49.6	277
NE-9420	Cooled in pot. Reheated to 1550° F. and quenched	123,500	98,675	19.2	50.3	262

TABLE VIII—Physical Properties of MEDIUM HARDENING NE Steels

(All samples oil quenched from 1550° F. and drawn as indicated except NE-8339 which is first normalized at 1600° F.)

Steel No.	Draw Temp.	Tensile Strength P.S.I.	Yield Point P.S.I.	% Elong. in 2"	% Red. of Area	Brinell Hardness
NE-8630	Treated in 1" Rd. Specimens from center position					
	800° F.	179,000	158,750	14.7	56.1	375
	1000° F.	146,250	134,500	17.7	60.0	321
	1200° F.	118,500	104,225	22.1	63.6	248
NE-8630	Treated in 2" Rd. Specimens from ½ radius position					
	800° F.	158,000	135,750	16.8	58.3	352
	1000° F.	136,525	118,225	18.1	60.2	302
	1200° F.	110,250	93,875	22.6	62.1	235
NE-8630	Treated in 3" Rd. Specimens from ½ radius position					
	800° F.	132,500	112,750	19.1	58.3	285
	1000° F.	121,225	105,625	21.3	60.1	262
	1200° F.	96,500	88,750	22.8	63.4	223
NE-8735	Treated in 1" Rd. Specimens from center position					
	800° F.	185,750	162,500	14.7	53.2	388
	1000° F.	152,825	141,220	17.3	54.5	321
	1200° F.	120,000	106,225	22.6	62.9	255
NE-8735	Treated in 2" Rd. Specimens from ½ radius position					
	800° F.	164,225	141,750	15.9	54.2	352
	1000° F.	140,750	119,825	18.5	58.3	311
	1200° F.	115,875	97,225	22.7	62.4	241
NE-8735	Treated in 3" Rd. Specimens from ½ radius position					
	800° F.	142,225	120,225	18.6	57.2	302
	1000° F.	127,750	111,500	19.5	59.1	269
	1200° F.	105,850	90,360	22.9	63.3	229
NE-9430	Treated in 1" Rd. Specimens from center position					
	800° F.	182,225	160,500	14.6	54.3	363
	1000° F.	148,750	137,225	17.5	58.3	331
	1200° F.	120,225	105,275	22.4	63.1	262
NE-9430	Treated in 2" Rd. Specimens from ½ radius position					
	800° F.	147,725	111,225	16.1	57.9	331
	1000° F.	136,225	111,500	18.3	58.9	293
	1200° F.	113,225	98,775	22.6	62.3	229
NE-9430	Treated in 3" Rd. Specimens from ½ radius position					
	800° F.	138,750	116,500	18.9	58.1	293
	1000° F.	124,225	108,725	20.6	59.3	277
	1200° F.	102,500	91,375	22.8	63.2	235
NE-9435	Treated in 1" Rd. Specimens from center position					
	800° F.	190,825	169,825	13.9	50.6	388
	1000° F.	152,325	140,500	17.1	54.9	321
	1200° F.	125,825	107,225	21.9	62.9	269
NE-9435	Treated in 2" Rd. Specimens from ½ radius position					
	800° F.	152,375	117,875	15.1	55.6	341
	1000° F.	139,000	113,875	17.1	57.1	302
	1200° F.	115,775	100,000	21.6	62.8	241
NE-9435	Treated in 3" Rd. Specimens from ½ radius position					
	800° F.	143,225	117,825	16.3	56.2	311
	1000° F.	130,250	112,225	18.1	57.1	293
	1200° F.	106,500	97,500	22.1	63.5	229
NE-9437	Treated in 1" Rd. Specimens from center position					
	800° F.	197,285	176,225	12.8	45.2	401
	1000° F.	160,250	143,250	15.9	53.2	341
	1200° F.	125,750	105,825	21.3	62.3	255
NE-9437	Treated in 2" Rd. Specimens from ½ radius position					
	800° F.	154,225	121,875	14.3	55.6	331
	1000° F.	143,875	115,325	16.0	56.1	302
	1200° F.	113,220	98,875	20.9	64.3	248
NE-9437	Treated in 3" Rd. Specimens from ½ radius position					
	800° F.	146,285	112,500	15.1	56.1	321
	1000° F.	138,570	107,625	16.7	54.8	302
	1200° F.	114,500	98,750	21.8	63.1	248
NE-8339	Treated in 1" Rd. Specimens from center position					
	800° F.	169,750	152,500	15	46	363
	1000° F.	140,750	112,500	20	52	285
	1200° F.	117,250	94,275	22	61	255
NE-8339	Treated in 2" Rd. Specimens from ½ radius position					
	800° F.	164,300	150,750	15.4	47.2	352
	1000° F.	135,225	112,000	18.2	54.1	293
	1200° F.	114,000	95,300	22.0	59.0	248
NE-8339	Treated in 3" Rd. Specimens from ½ radius position					
	800° F.	128,500	110,250	18.3	56.7	277
	1000° F.	121,750	99,750	18.9	58.0	262
	1200° F.	106,500	89,500	21.3	61.1	223

the same as the hardness of the 3-inch round bar at the center because the cooling rate is the same.

If the quenched hardness on the surface of the same 3-inch round bar is in question, Table II shows us that 3-inch round bar quenched in water cools at about 400 degrees Fahr. per second at the surface. Reference to Table I indicates that the Jominy sample cools at 400 degrees Fahr. per second between 1/16 and ⅛-inch from the quenched end and therefore whatever hardness the Jominy test showed at this same location will be approximately the hardness of the 3-inch round on the surface.

We can also continue deductions from the Jominy test in order to determine approximate tensile strength. Suppose, for example, that we desire to know the approximate tensile strength, yield point, elongation and reduction of areas of this same 3-inch round bar after quenching.

By reference to Jominy test hardness and Tables I and II we get the rockwell hardnesses for the surface, one-half radius and center of the 3-inch round after quenching as explained in the previous paragraphs. Now refer to Table III which starts out with rockwell hardnesses and develops from these the brinell, tensile strength, yield point, elongation and reduction of area. These figures are the result of tabulation of many actual tests and are remarkably close to actual results but must be considered only approximately correct and

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Greater Protection

320

Developed especially to assure greater protection than the usual open motor, Century Form J, General Purpose Motors have a protecting hood over the upper half of the motor, preventing falling solids or dripping water from entering vital motor parts. This is particularly advantageous when motors are installed *below the work level* on machine tools — constantly exposed to falling chips of metal.

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are for use only as a guide.

For example, here is an actual case together with the steps used in working out a problem. Assume that we have run a Jominy test on a sample of NE-9440, and have obtained rockwell readings as suggested above. We now want to find out what physical properties will be developed at half radius on a 3-inch round bar of this steel when oil quenched and before drawing. We will proceed in the following sequence.

A—Table II tells us that a 3-inch round quenched in oil will cool at the rate of 12 degrees Fahr. per second at one-half radius.

B—Table I shows that the Jominy test specimen cools at approximately 12 degrees Fahr. per second at a point 15/16-inch from the quenched end.

C—The sketch shows that at 15/16-inch from the quenched end of the Jominy test specimen of NE-9440 steel, the hardness was 35 rockwell C.

D—Conversion Table III tells us that 35 rockwell C is approximately the same as brinell 325.

E—Table III also shows that because the hardness of the 3-inch round at 1½ radius will be 325 brinell the approximate physical properties at half radius after oil quenching will be: Tensile strength, 153,000 to 172,000 pounds per square inch; yield point, 137,000 to 146,000; elongation in 2 inches, 16 to 20 per cent; reduction of area, 47 to 56 per cent.

It should be noted that these physicals are in the as-quenched condition. Naturally tensile strength and yield point will be reduced, also elongation and reduction of area will be increased, by whatever draw temperature is used following the quench.

In Table IV will be found data on the approximate relationship between drawing temperature and tensile strength compiled from averages of a large number of tests on alloy steels ranging from 0.35 to 0.45 in carbon content, all fully quenched. This data is primarily to help in determining the draw temperature to use in an initial test, since no great accuracy can be expected in this relationship.

A listing of suggested substitutions of NE steels for standard AISI-SAE steels is given in Table V. Note it is divided according to carburizing grades, medium hardening grades and high hardening grades.

In Table VI will be found temperature ranges for forging, normalizing, annealing and quenching typical NE steels. In this tabulation, steels also are arranged according to carburizing, medium hardening and high hardening grades.

In Table VII are physical property figures for the typical carburizing NE steels, including conditions of heat treatment and resulting tensile strength, yield point, per cent elongation and reduction of area, brinell hardness.

Tables VIII and IX contain similar information on typical medium hardening and high hardening grades, respectively.

Of course any tentative selection of a substitute steel made from these data must be supplemented by careful tests in your own plant under your own working conditions to be certain the steel will satisfactorily meet your requirements.

MIRRORS MEASURE HOT STEEL PLATE

A SYSTEM of mirrors, devised at Westinghouse Research Laboratories to enable workmen to measure at a glance the width of hot steel slabs rolling shoulder high from the mill may assist in speeding armor plate production in one of the nation's giant new steel mills. In the mill plates travel from the rolls too high to use a gage; also they must be accurate to within ½-inch before they go to other rolls to be squeezed into long sheets. If too narrow, the sheet will be too narrow. And if the plate is too wide the excess must be cut off and scrapped. The system of mirrors devised by Dr. E. D. Wilson superimposes images of the steel plate on a lined chart, showing plate's width at once.

Substitute Material Lightens Protective Mask

Pre-formed plastic frames are being substituted for those of aluminum or zinc in the light-weight protective masks being produced by Martindale Electric Co., 1427 Hird avenue, Cleveland. These, according to the manufacturer have not impared the efficiency of the mask in any manner, but have effected a reduction in weight by about 2/5-ounce.

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AMERICAN CABLE TRU·LAY *Preformed* WIRE ROPE

Last year over 180 million man-days of productive time were lost through industrial accidents—many of them needless.

Just think how many tanks, ships, guns, planes and so forth could have been made with those 180,000,000 man-days of work. . . . With our soldiers, sailors and marines giving their all, twenty-four hours a day, it is a crime not to do everything possible to reduce this terrific toll on needed production.

AMERICAN CABLE TRU-LAY PREFORMED WIRE ROPE is helping many operators keep down accidents because it is a safer rope to use and handle. **TRU-LAY PREFORMED** resists kinking and snarling. It resists whipping; spools better. When crown wires in **TRU-LAY PREFORMED** become worn and broken they do not wicker out to become chisel-sharp jaggers to tear workmen's hands. They remain in place, making **TRU-LAY** *much* safer to handle.

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What Can Cause Breakage of a

WELDED SHIP???

By J. F. LINCOLN
President
Lincoln Electric Co.
Cleveland

THE BREAK in the oil tanker, SCHENECTADY, at the Swan Island yard, while standing at the dock and after a trial run, has caused much discussion. This failure has been attributed to a number of causes including shrinkage stresses in the welds, earthquake, silt collecting under the boat, a wind blowing from the side, improper loading.

This failure is important because there is little doubt that it is possible for the same failure to occur in many other ships. We therefore, must accurately evaluate what happened.

Let us first consider the possible causes listed above. We can be sure that the so-called locked-up stresses of welding did not cause the break. These stresses decrease continuously as soon as weld is cold. Such stresses would, of necessity, cause failure immediately or not at all.

If improper loading would cause failure, it certainly would not cause it at the dock—it would have occurred when the ship was in a seaway during its trial trip.

We probably can also rule out the other suggestions which appear even more fatuous.

In arriving at the actual cause, the following fundamental fact should be considered. It is possible to have unequal expansion of the shell of the ship compared to its deck. The temperature of sea water is fairly constant compared to the air temperature in cold weather. Thus the deck is likely to contract much more than the shell, putting a tensile stress on the deck which may be very great. For instance, a difference of 15 degrees Fahr. between the shell and the deck will make a relative change of ¾-inch in the length of the deck and shell. Normally the deck would stretch by this amount without further damage.

But there are conditions which would not allow such a happy outcome. If there is an incipient tear started at the longitudinal center of the deck, then all the stretch will take place at this point. If there is an abrupt change of section in the deck structure, the same tendency will result. If the stretch forced by this unequal expansion takes place at this one point, rupture must result. This is obviously what happened in all the cases of known failures.

Obviously, all ships so made are threatened with the same failure if the same unhappy combination of circumstances should take place. However, this can only occur when the temperature of the deck is much lower than the temperature of the shell. Therefore, if the ship has gone through one winter without failure, the chances of its failing later are extremely remote.

There are three suggestions as to how the above possibility can be entirely eliminated. **First,** obviously, is to make the deck relatively stronger than the shell so the deck will bend the shell instead of the shell stretching the deck.

The second suggestion would be to put a wrinkle in the deck so that the pull mentioned will straighten out this wrinkle before it put any great tensile stress on the deck.

Third, and this is more reasonable than the other two, is to put the deck under a sufficient compression at time of construction so that under any difference of temperature to which the ship will be exposed in service, the deck will not be put under a tensile stress which will approach its minimum strength at any point. This can easily be done at the time of welding the deck together by wedging it apart in the center section.

Of course, another obvious solution is to expose the ship after construction to the maximum temperature difference between shell and deck, allowing it to break. This will relieve the stresses. Then the deck can be welded up in that position. No further break could occur under this procedure. It seems, however, that this would be a senseless approach to the solution.

Miniature Steel Mill Aids Uncle Sam

A baby steel mill that turns out ingots weighing only 13 pounds is playing an important part in the country's expanding warplane program, officials at the Westinghouse Research Laboratories disclosed recently. Westinghouse research metallurgists are using the mill to replace a thermometer manufacturer's dwindling supply of Kovar to avert a threatened break in production of temperature gages for bomber and fighter planes.

Kovar, a special metal alloy which can be drawn into a delicate wire only two-thirds as thick as a strand of human hair, was developed by Westinghouse as a metal sealer for electronic tubes. Later, it was unexpectedly adopted by the thermometer manufacturer to make a key part of his device, which electrically measures the heat in airplane engines and wings. A 3-foot length of this wire is coiled tightly inside a metal tube immersed in the engine oil. As the motor warms up the wire becomes hot and offers more resistance to a small electric current passing through it. This is instantly reflected by a pointer on the pilot's instrument board. The resistance properties of the metal are ordinarily not important. But to the thermometer concern the resistance of the alloy, particularly the way the resistance increases as the metal gets hotter, were vital.

As war demands depleted the manufacturer's original supply of wire, he sought more that would resist the electric current at precisely the same rate. He tried sample after sample of Kovar without success. Production was threatened because the thermometer design was based on the resistance of the old wire and there was not time to re-design the whole device. Westinghouse metallurgists sent four suitable Kovar ingots to the thermometer plant. Each was the result of painstaking measurement of the alloy ingredients and careful cooking of the mixture in a tiny electric furnace. After each ingot was cooled and forged into a rod, samples from it were closely checked for resistance values in the laboratory.

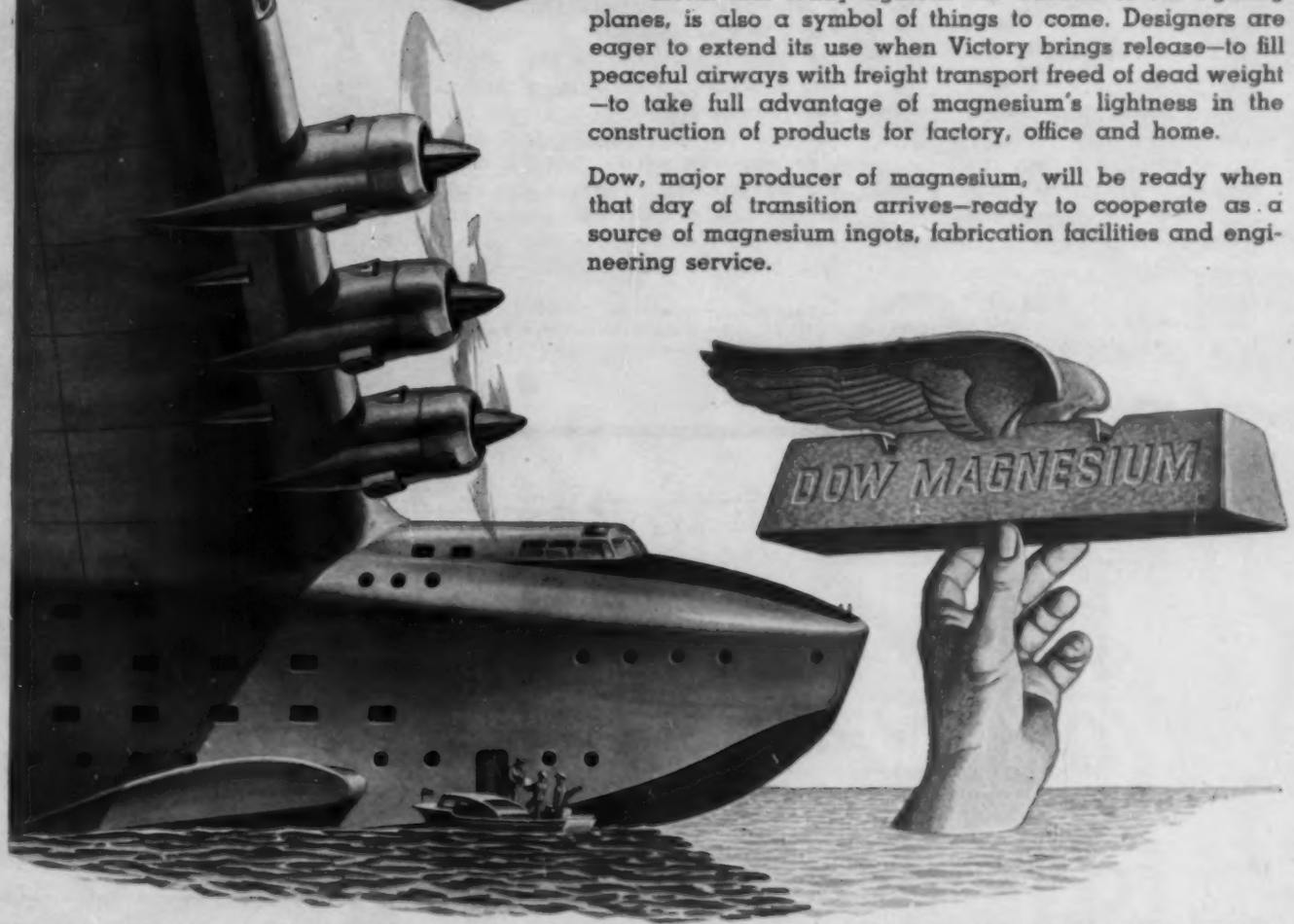
By making minute changes in the ingredients and in the melting process, the research men produced an exact duplicate of the original Kovar supply: thus the plane thermometer output can keep pace with the air forces' demands. A half dozen ingots of this metal will keep this plant supplied for years. Each ingot contains enough Kovar to make 56 miles of wire.

DOW

DOWMETAL

Magnesium, the extraordinary weight-saving metal that today lightens the burden of our fighting planes, is also a symbol of things to come. Designers are eager to extend its use when Victory brings release—to fill peaceful airways with freight transport freed of dead weight —to take full advantage of magnesium's lightness in the construction of products for factory, office and home.

Dow, major producer of magnesium, will be ready when that day of transition arrives—ready to cooperate as a source of magnesium ingots, fabrication facilities and engineering service.



THE DOW CHEMICAL COMPANY, MIDLAND, MICHIGAN

MAGNESIUM

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BLAST FURNACE *Metallurgy*

By C. D. SMITH
Jones & Laughlin Steel Corp.
Pittsburgh

METALLURGICAL study of blast furnace operations has not received the same attention as other branches of steelmaking. The immensity of the problem the blast furnace operator faces is realized only too well. Most of the trends shown here are already well recognized by the operator, but it is hoped that their quantitative effect can be used for a more direct control from both an iron and production standpoint.

Three solid raw materials—iron ore, coke and limestone—charged in at the top of the blast furnace meet the air forced in at the tuyeres near the bottom, resulting in two currents moving in opposite directions; a slow current of solids descending, and a rapid current of gases ascending. While the furnace operator cannot control these currents completely, he is usually able to maintain a balance by controlling the wind, blast temperature and amount of materials entering the furnace.

Inspectors were placed at the furnaces in September 1941 to cover the operations and record data. The object was to develop means of more positive blast furnace control, to determine the effect of various factors on blast furnace operations and to assist the blast furnace personnel. Work to date has covered No's. 4, 5 and 6 furnaces at the Pittsburgh Works, during the period Sept. 1, 1941 to March 1, 1942 on No. 4,

From a paper presented at the Feb. 12, 1943, meeting of the Eastern States Blast Furnace and Coke Oven Association, Pittsburgh.

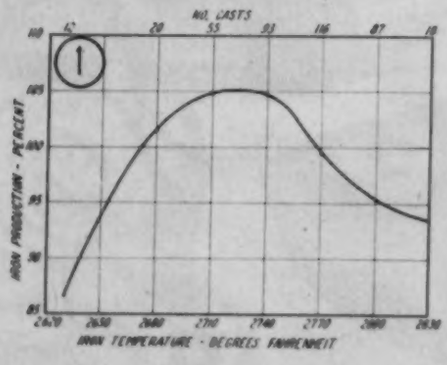
Fig. 1—Effect of iron temperature on iron production

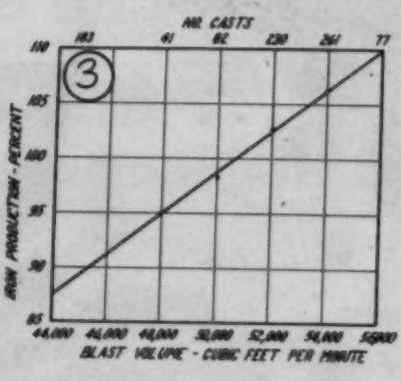
Fig. 2—Relationship between iron composition and temperature of bessemer iron

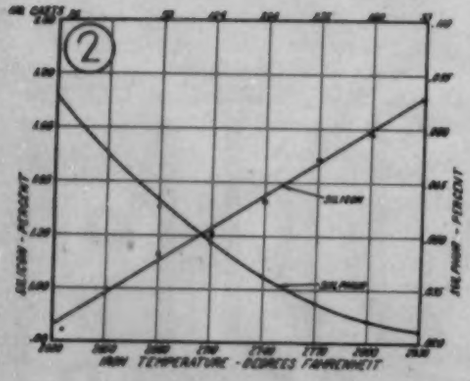
Fig. 3—Relationship between blast volume and iron production

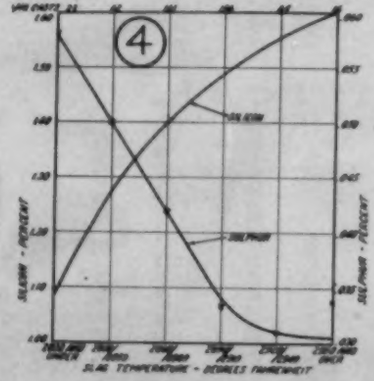
Fig. 4—Relationship between slag temperature and iron composition

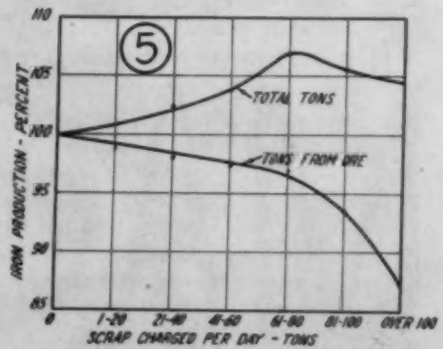
Fig. 5—Effect of scrap charged on iron production. Lower curve shows tons of iron reduced from the ore alone











and since June 1, 1942 on No. 5 and 6 furnaces. All furnaces were producing bessemer iron.

The making of iron in the blast furnace involves a smelting of iron ore, usually about 50 to 55 per cent Fe, with sufficient fluxing materials to remove the gangue. Much depends on the type of ore used and how it conforms in analysis with respect to silicon and phosphorus. As these elements fluctuate, so must the methods of operations be regulated to meet the changing conditions.

The physical size of the ore should be kept within reasonable limits in order that a satisfactory distribution of stock is maintained within the furnace. The importance of good distribution of the burden within the furnace has been repeatedly shown whenever it has been necessary to operate for a short time without the use of the small bell.

Coke ash and sulphur content together with strength and bulk density are also important. The first control points, therefore, should be instituted at the ore mines and by-product plant.

One of the most important factors influencing iron production and iron analysis is *temperature*. Iron temperatures are taken on each cast by the blast furnace inspector using an optical pyrometer. The effect of iron temperature is well known; generally a cold furnace produces iron low in silicon and high in sulphur, while a hot furnace produces iron with a high silicon and low sulphur content. Neither iron is a good product to send to the bessemer or open-hearth departments.

At the bessemer, a low silicon iron might result in cold blown bessemer steel which will mean a loss in yield due to poor pouring and heavy skulls, with further losses at the chipping beds in the form of larger scrap losses and higher reconditioning costs. Scrap which is normally added as a coolant must be omitted since the temperature of the blown metal is not adequate using low silicon iron. During normal times, this method of utilizing scrap is most desirable since it is the quickest and most economical means of converting scrap to ingots.

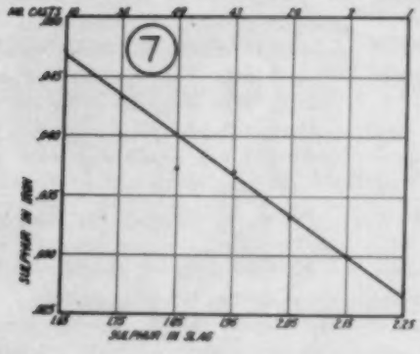
A high silicon iron causes formations

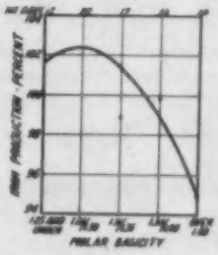
Fig. 6—Effect of scrap charged on iron production

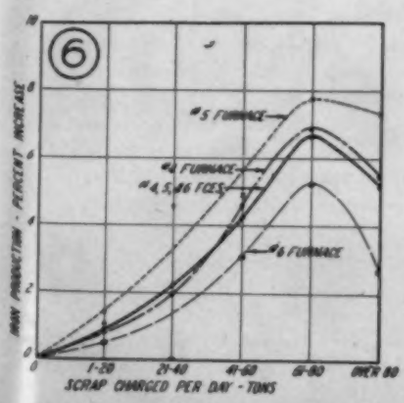
Fig. 7—Relationship between sulphur in the slag and sulphur in the iron

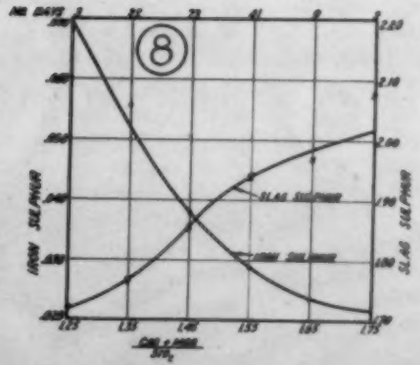
Fig. 8 — Effect of slag basicity on sulphur removal

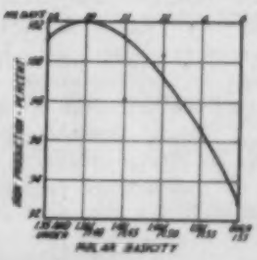
Fig. 9—Influence of slag basicity as measured by Molar basicity on iron production of No. 4 and 5 blast furnaces











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	#4 BLAST FURNACE	#5 BLAST FURNACE
AVERAGE PERCENT ASH	9.67	8.86
PERCENT OF DAYS OVER 9.5 ASH	91	0
AVERAGE COKE SULPHUR	1.0.9	.9+2
PERCENT OF DAYS OVER 1% SUL	75	0

in the convertor called kidneys and excessive slopping of iron from the mouth of the vessel. When these kidneys become large, an excessive number of blanks have to be placed in the convertor bottom which increases blowing time, reducing production slopping causes an increase in "off analysis" and generally poorer quality blows due to the varying amount of metal lost. High silicon iron is objectionable to the open hearth also since it deoxidizes the bath, causing an increase in furnace time, increases the amount of fluxes necessary and attacks the furnace bottom. A low silicon iron is desirable for open-hearth metal, but care must be taken to keep the sulphur within certain limits. Several companies are following a desiliconizing process which keeps the silicon content at the point which the open-hearth people desire.

Fig. 1 is a correlation showing the effect of iron temperature on the production rate of No. 4 furnace. Those casts on which the wind blown was under 52,000 cubic feet per minute were excluded. This condition was due to mechanical difficulties with the blowing engines. As shown, the highest rate of production was obtained with an iron temperature range of 2690 to 2750 degrees Fahr. Within the range of temperature observed the decreased production amounts to about 17.1 per cent at temperatures lower than 2660 degrees, and 10.7 per cent for temperatures higher than 2810 degrees.

Only about 35 per cent of the casts observed were within the temperature range for optimum production indicating the possibility of closer temperature control improving production on 65 per cent of the casts. Assuming that the optimum temperature range were in effect, a calculation indicates that 5 per cent more iron would have been produced over the casts studied.

Since there is an iron specification to meet, which in this case is 1.10 to 1.60 silicon with 0.050 maximum sulphur (bessemer iron), the rate of production cannot be studied without consideration of the chemical analysis of the iron being made. Fig. 2 shows the characteristic silicon-sulphur relationship with respect to iron temperature. It is interesting to note that temperature at which optimum production is obtained shows an average silicon range of 1.15 to 1.40 and average sulphur range of 0.035 to 0.055 per cent. While the sulphur obtained with this temperature range is rather high, statistical study indicates that the cost of reconditioning bessemer screw steel, which is the principal grade made, would not be increased.

The effect of iron sulphur on machinability, within the ranges studied, indicated a slight increase in machinability as the sulphur in the iron increased. Even with the low sulphur bessemer steels we understand that some bessemer operators add sulphur to low sulphur iron in order to increase the sulphur to about 0.035 to 0.045 for the best bessemer ingots. All the above tends to confirm the idea that no particular penalty is suffered if the sulphur in the iron runs up to 0.050 maximum. However, when making low sulphur bessemer steel for the strip mill, this element must be kept under 0.030 per cent. The blast furnace people are notified when these grades are to be made and the furnaces are burdened to give this sulphur limit.

There is also the possibility of running a lean burden on the furnace to increase production, then desulphurizing with soda ash or some such desulphurizing agent. Iron desulphurization is being investigated by quite a few companies and we would expect further progress in this direction with the present need for additional iron production.

Production, Wind Blown Related

When it appears that the furnace is getting a bit cold, there are several ways by which it may be righted. Sometimes a slight increase in blast temperature will suffice; a more positive effect may be obtained by a "cut" in ore burden; and a still more positive effect by charging blanks of coke. The quantity of blast can also be reduced although this practice is avoided unless absolutely necessary. In each of these cases, with the possible exception of the change in blast temperature, tonnage output will be reduced. Our present ore burden practice is to charge as much ore as the furnace will take. If the furnace is hot, additional ore is charged until at last the furnace "cools off".

While the effect of the blast volume on iron production is generally known, it is interesting to review the potent effect it has on this feature. Fig. 3 shows quite clearly that the production increases directly with the wind blown. With a blast volume of 45,000 cubic feet per minute for the first group, and 56,000 cubic feet per minute for the last group, an increase of 21 per cent was obtained from the increase in wind. Actually, an increase of 21 per cent in blast volume shows an increase in production of 21 per cent which serves to illustrate the close relationship between blast volume and production. To obtain maximum production it is necessary to maintain the optimum blast volume that the furnace will take.

Our standard blowing practice is to maintain the highest wind volume possible without making an abnormal amount of flue dust. One factor which it is felt has limited the amount of blast volume which a furnace can take has been the per cent of ash in the coke. A reduction in ash should produce a more open burden as well as reduce the amount of silica entering the furnace. With less silica entering, the furnace should operate with less limestone allowing somewhat more space for ferrous materials.

Our studies on No. 5 furnace showed a better performance when operating with a lower ash-sulphur coke. We understand that some furnaces are operating with coke as low as 6 per cent ash —0.60 sulphur and maintaining a high rate of production and blast volume with low flue costs. This indicates that a good uniform coke is imperative for the successful operation of the blast furnace.

It is interesting to note the similarity between Fig. 2 showing the relationship of iron temperature and chemical analysis, and Fig. 4 which shows the effect of slag temperature on silicon and sulphur content of the iron. The slopes of the silicon and sulphur curves compare quite closely for the two graphs, indicating a close relationship between slag and iron temperature. The slag temperatures have been determined with an optical pyrometer using an emmisivity index of 0.40. McCaffery with others calibrated the optical pyrometer against a standard platinum-platinum rhodium thermocouple and found the temperature correction of blast furnace slag equivalent to that for a material whose emmisivity is 0.65. 'On this basis the temperatures shown on Fig. 4 are slightly higher throughout than the actual temperature.

Charge Changes React Slowly

Since the slag temperature is obtained at the flush which is approximately one to two hours previous to cast, a means of forecasting the finished sulphur and silicon would mean that a change in the furnace operation could be made earlier than otherwise. While this change, in most cases, will be too late to correct the iron being cast two hours later, the change should be effective in more promptly correcting the difficulty. While a change in blast heat or blast volume will affect the iron being made currently, an ore change, coke blank or limestone change will not affect the iron until 8 to 10 hours after the material is charged. Under such a condition it is necessary for the furnace operator to look ahead and consider the effect of burden changes made now on the furnace two or three casts hence.

The effect of scrap additions on pro-

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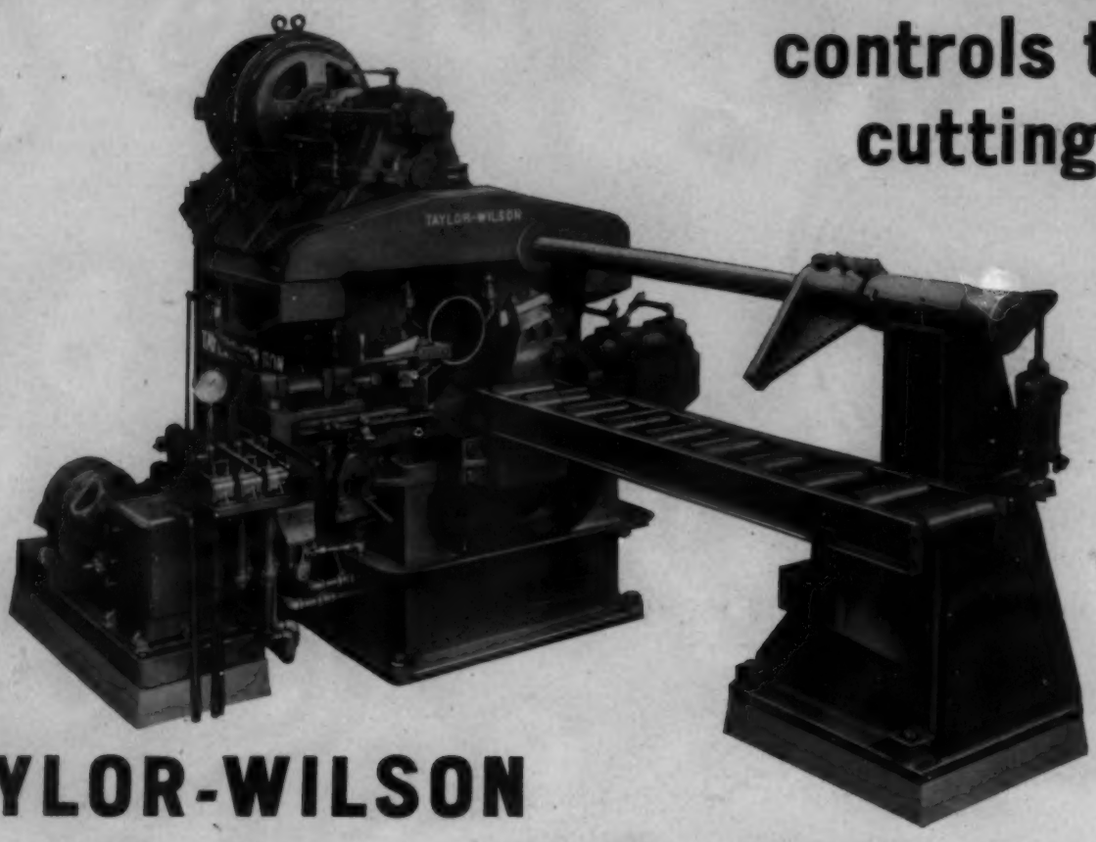

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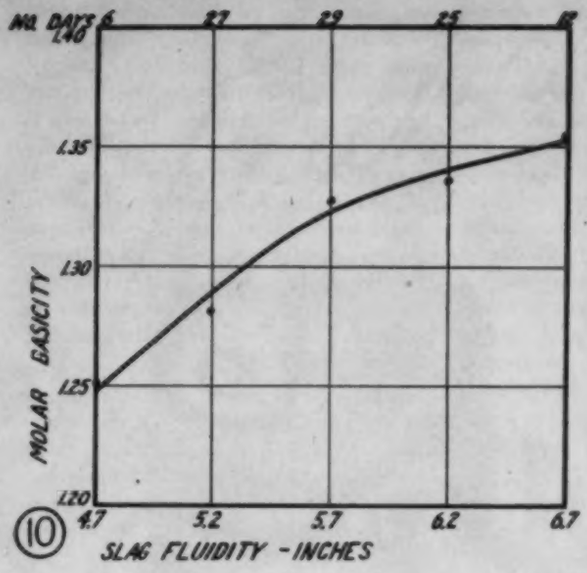

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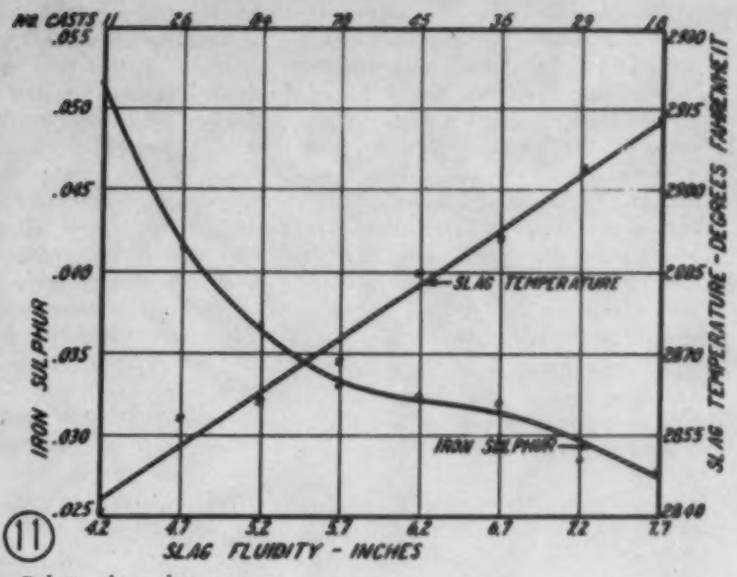

11

Fig 10 — Relationship between slag fluidity and Molar basicity

Fig. 11—Relationship of slag fluidity to slag temperature and sulphur in the iron

duction has been discussed a long time. Since the amount of Fe per unit volume is higher for the scrap than ore charged, it seems logical that the more scrap added the more will be produced. This seems to be generally true; however, as shown on Fig. 5 the iron production reached an optimum when 60 to 80 tons of scrap were charged per day. It will be noted, that although the production is somewhat lower with scrap additions greater than 60 to 80 tons, the production remains above the average rate of those days with less than 60 tons of scrap.

Fig. 5 also shows the tons of iron reduced from the ore alone. As expected, with increased scrap charges, the tons of iron reduced from the ore decreased. This relationship is due to the displacement of the ore with scrap, decreasing the amount of ore that it is possible to add as the amount of scrap charged increased. In this study, the casts were again limited to those with a blast volume over 52,000 cubic feet per minute. Further study on No's. 5 and 6 furnaces during the period June 1, to Sept. 15, 1942, supported the results found on No. 4 furnace. Fig. 6 shows the production curves for these furnaces with varying amounts of scrap charged, and indicates the close relationship with an optimum production rate with 60 to 80 tons of scrap per day. No attempt has been made to evaluate the effect of the various kinds of scrap charged; however, that charged into these furnaces is generally a pretty good grade.

One of the many problems of blast furnace operators is to keep iron production up and sulphur in the iron down. The sulphur specifications submitted to the blast furnace require that the furnace be burdened with sufficient fluxing materials to produce a slag of sufficient basicity to remove the sulphur in the iron, since as already shown hearth temperature and also slag fluidity are effective. Most of the sulphur which enters the furnace arrives with the coke, and leaves the furnace in the slag and in the iron.

Fig. 7 shows the relationship between the sulphur in the slag and the sulphur in the iron. It is generally agreed that most of the sulphur removal takes place at the hearth as the drops of iron trickle through the slag. Kinney found that metal removed from the blast furnace just above the tuyeres contained three to four times as much sulphur as the iron at the cast.[2] Herty and Gaines conclude that most of the sulphur is removed while the metal is passing through the slag.[3] Just as in the open hearth, sulphur removal is very much dependent upon the basicity and fluidity of the slag. Joseph could not find any simple relationship by which chemical composition termed "basicity", could be compared with desulphurization.[4] His work, however, referred to slags covering a wide range of composition.

Our furnaces making bessemer iron are operating with a slag of approximately 10 per cent MgO and 8 to 9 per cent AL_2O_3, varying less than 1 per cent from day to day. Within these limits it is felt a direct relationship exists between basicity and desulphurization. Using the formula $\frac{CaO\ MgO,}{SiO_2}$ which is generally accepted as a fair measure of slag basicity, a correlation with sulphur in the slag and sulphur in the iron is shown in Fig. 8. As expected, with an increase in the basicity of the slag, there is a decrease of the sulphur in the iron and an increase of the sulphur in the slag.

It has been thought that the desulphurizing power of blast furnace slag varies directly with *Molar basicity*[5]. A study of the effect of the basicity on production and iron sulphur, using molar basicity to represent the chemical composition of the slag, indicated an increase in production of about 7 per cent when operating with a lean slag. The formula used to determine the molar basicity was as follows:

[% CaO — (1.75 x % Sul. in Slag)] ÷ 56 + [% MgO ÷ 40] over
(% SiO_2 ÷ 60) ÷ (% Al_2O_3 ÷ 102)

Each oxide has its own effect on desulphurization and the degree of the effect is not constant for all ranges of composition.

Joseph has shown that Al_2O_3 cannot be ignored in computing basicity, as it is frequently done. Each acid and base has been divided by it's molecular weight which partially corrects for the variation in basic or acidic properties of the oxides in the slag. The basicity was determined by the daily slag analysis reported by the chemical laboratory and is a composite sample of the slag at flush and cast. A correction for the sulphur in the slag has been included, since some lime (CaO) is combined with the sulphur in the slag, as CaS, and the per cent CaO reported by the laboratory includes all the Ca in the sample.

The study was duplicated on No. 5 furnace during a later period and while the studies were made on different furnaces both were making bessemer iron and operated on about the same burden. Fig. 9 shows the increase in iron production obtained on each furnace when the molar basicity was decreased. In both studies a gain of approximately 7 per cent was shown over the range

of basicity indicated. The striking difference between the two tabulations, however, is the lower range of the basicity found on the No. 5 furnace study. During the study on No. 4 furnace, only 32 per cent of the days had a molar basicity of under 1.36, while that on No. 5 furnace showed 64 per cent of the days within this range. This leaner slag, due primarily to the installation of coal washing equipment, played a larger part in the production records made during the latter periods.

The slag basicity on which the furnace can operate, to a great extent, is determined by the sulphur and silicon content of the raw materials being charged. Large fluctuations in these two elements prevent operating the furnace at the point for optimum performance since a range of safety is needed in case of sudden changes in composition. A reduction in the variation of coke quality and a reduction in coke sulphur has been achieved since the new coal washer was installed.

Washer Reduces Ash Content

A comparison of the coke sulphur and per cent ash in the coke during the two periods studied is also shown in Fig. 9. The ash content was reduced from 9.67 to 8.86 per cent and the average sulphur from 1.03 to 0.962 per cent after the coal washer was installed. The percentage of days having a coke sulphur over 1.00 per cent was reduced from 75 to 4 per cent, and the number days with an ash content over 9.5 per cent was reduced from 81 per cent to zero after the coal washing equipment was installed.

The reduction in average values probably does not wholly represent the advantages by the coal cleaning equipment. The variation or spread of ash and sulphur content has been reduced appreciably. The by-product plant reports the ash to vary as widely as 3 per cent from day to day, and the sulphur over a range of 0.030 per cent for the unwashed materials. This variation in ash has been reduced to about 1 per cent and the sulphur to about 20 per cent. This reduction in ash content would also increase the carbon available for the chemical and thermal reactions of furnace operation.

Another factor which must be considered is the effect of more extensive mechanical methods of mining and the reduction of the general quality of the coal being mined. An increase in the slate, ash and sulphur can be expected and will necessitate the use of coal washing equipment to make coke which the blast furnace man can use profitably.

A study made in 1935 at our blast furnaces comparing washed and unwashed coal reported results definitely showing the advantages of such equipment; production was increased, coke co sumption and flue dust were reduced, slag per ton of iron was less, and limestone consumption was lowered. The furnace moved more regularly and chipping losses on the resultant steel were reduced appreciably after the change. This study was conducted on No. 5 furnace making bessemer iron. Such a study illustrates the importance of maintaining raw materials of good quality and uniformity to produce the greatest amount of quality iron. Other cases showing the effect of improved raw materials on iron production have been found from time to time.

The use of iron ore concentrates, and the use of sinter are a few specific changes which have yielded increased iron tonnage. By taking advantage of ore preparation methods, screening and washing, the Fe in the concentrate was increased 2 to 3 per cent and the physical size of the ore was larger and more uniform. Test runs on the furnaces making bessemer iron and charging 100 per cent concentrates indicated an increase in production rate of 60 to 80 tons per day and a decrease in coke consumption of approximately 100 pounds per ton of iron. Another preparation of raw materials which should be considered is the sintering of the ore.

Should Make Materials "Count"

A test run made on No. 3 furnace at Pittsburgh works using 31 per cent New York magnetic sinter, analyzing 65.2 per cent iron and 3.6 per cent silica, showed an increased production of approximately 100 tons per day and a reduced coke consumption of almost 2000 pounds per ton of iron. Increasing production by means of the selection and preparation of blast furnace materials is particularly timely since more iron is made using the existing plant facilities. While building new blast furnaces will increase iron production eventually, vital materials and valuable time are consumed by this method.

Little mention has been made of the effect of slag fluidity on furnace operation and performance. The fluidity has been determined by the use of a viscosimeter measuring the flow of slag in a tube of 5/16-inch diameter. In sampling the slag at flush, a test spoon is cast into the viscosimeter and the length of flow is measured by a rod inserted in the open end. In this method the length of flow actually measures a combination of slag fluidity, the reciprocal of viscosity and melting point.

The general relationship between slag fluidity as measured by this method and the basicity is shown in Fig. 10. It will be noted that an increase in fluidity indicates more basic slag. The use of this method of determining basicity, however, is limited by the effect of slag temperature on fluidity. As shown in Fig. 11, the sulphur in the iron decreases with an increase in the fluidity of the slag. This decrease, however, might be due principally to the increase in the slag temperature also shown. Further study is being made to expand the use of fluidity and temperature to maintain a closer control of the furnaces.

The importance of maintaining the furnace in balanced equilibrium is shown repeatedly throughout our study. Any undue fluctuation in one of these is sufficient to influence and upset the others since each is so closely related to the other. As pointed out by Graham and Work, the effect of a relatively small variation in ash content of the coke is accumulative.[6] An increase in ash decreases the percentage of total carbon in the coke, and at the same time increases the weight of the slag formed; this in turn requires an increased amount of carbon to raise it to its melting point and then heat it to furnace temperature, thus reducing considerably the carbon available for other necessary chemical and thermal reactions of furnace operations. Further additional flux is needed which requires heat for melting and reduces the amount of ore which can be charged—thus decreasing production and increasing coke consumption.

While our work has barely scratched the surface it already shows that there are certain features, better knowledge of which will go far toward the production of more and better quality iron. Within the limits of our work to date the following items show promise of helping to attain this goal:

—Maximum blast applied.

—Lowest practical Molar basicity.

—100 per cent washed coal for coke.

—Close control of operating temperature.

—Keeping scrap additions within the indicated percentages.

—Most important of all, *use of the best possible raw materials obtainable.*

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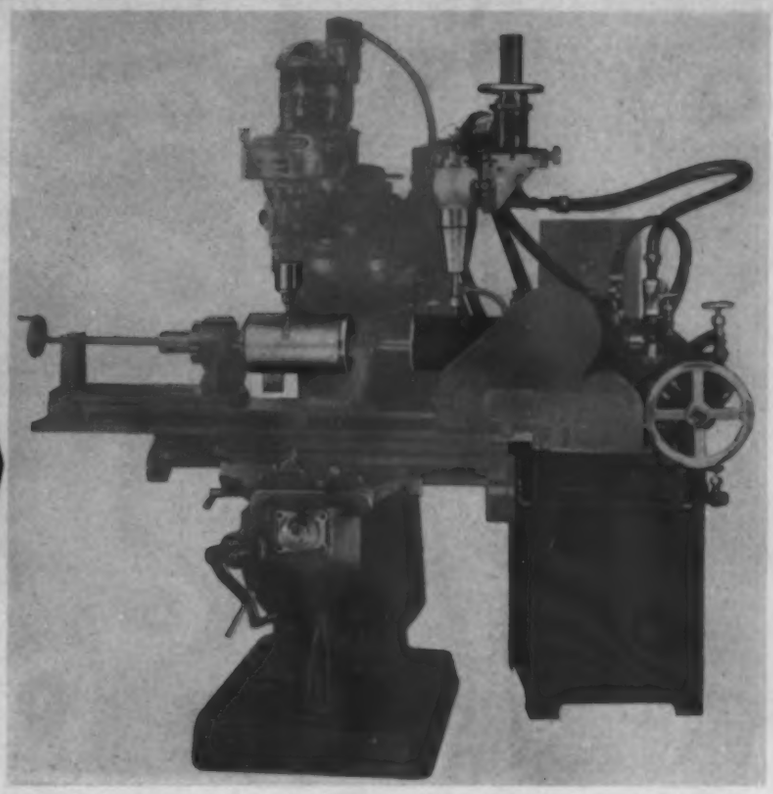

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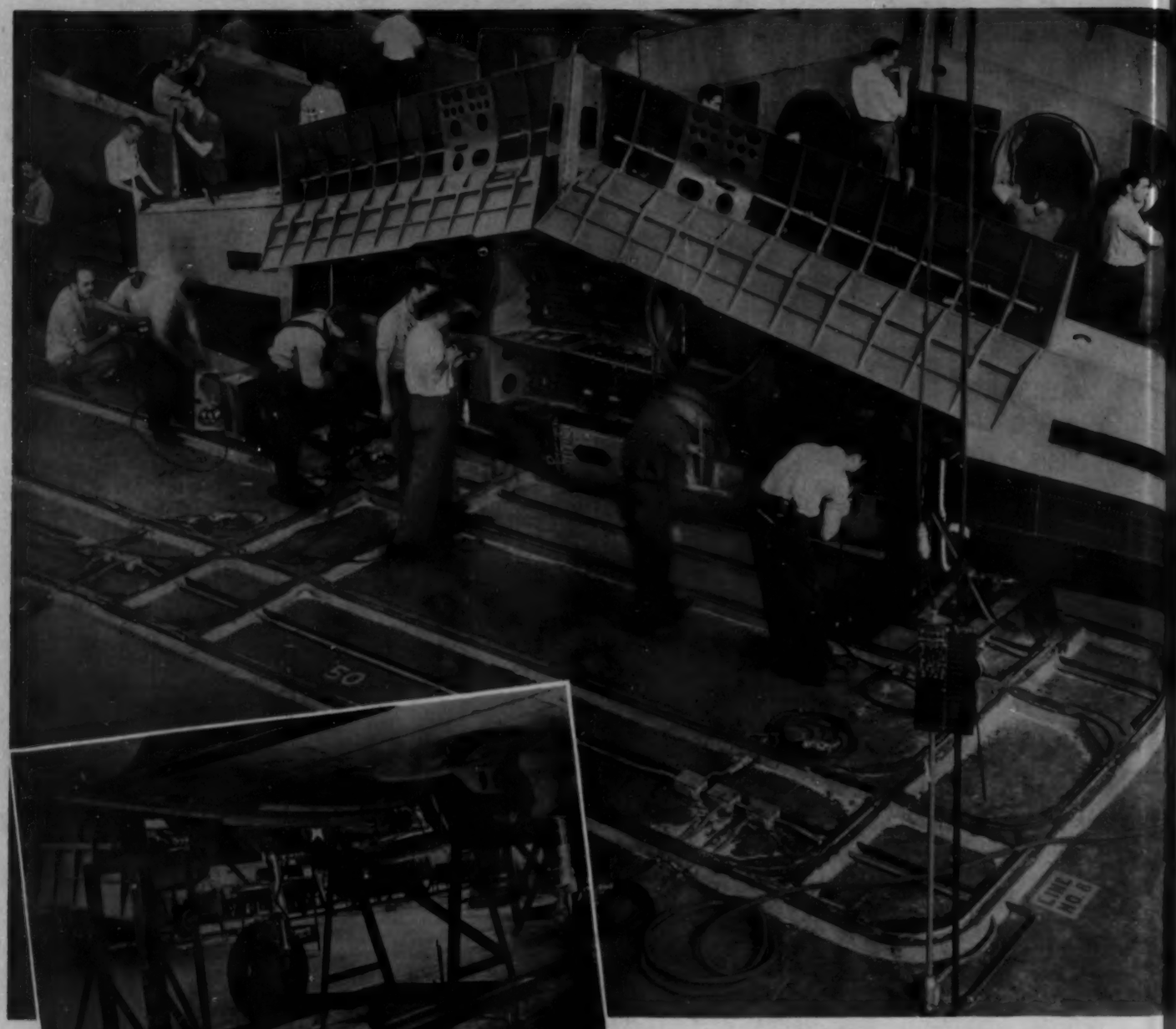


Fig. 6. (Top)—Extremely flexible track layouts such as that portion shown here permit efficient movement of sections. Four crossovers shown here allow two supports each with four wheels to be moved from one pair of tracks to the adjoining pair simultaneously

Fig. 7. (Directly above)—Dollies have wheels with a 90-degree V cut in their surface. These then straddle inverted rolled steel sections which form the top of concrete rails as shown here

Fig. 8. (Right)—Old degreasing setup required operators to load and unload each item of group of parts by hand in a basket suspended above the tank as shown here

By A. D. PALMER JR.
Airplane Division
Curtiss-Wright Corp.
Buffalo

New and Revamped Factories ROLL OUT THE WARPLANES

. . . . in ever-increasing numbers by means of conveyorized production lines

(Concluded from Last Week)

THE FORMER method of degreasing small parts prior to assembly required manual handling of all parts. This, of course, limited production for each item or group of parts had to be loaded and unloaded separately by hand. The original setup employed is shown in Fig. 8. The new method, which can be seen in Fig. 9, brings parts to the degreasers on a roller conveyor. Several racks are available so some can be loaded or unloaded conveniently at conveyor level while two are in the degreasers. Inspection is coordinated with the degreasing operation, which greatly increases production.

A roller conveyor in the salvage department cuts down the handling of precious bales of scrap metal. Other conveyors speed flow to the baling machine. A moving belt conveyor in the same department is used to sort the thousands of rivets that are retrieved from floor sweepings. Rivet sorting has paid for itself many times over by keeping assembly lines moving when rivet shipments were unavoidably delayed.

As production increases, it becomes necessary to speed up the final assembly department because, with more parts available, more airplanes can be built. Assembly lines several blocks long have been established for the final assembly of wings, motor and fuselages.

The caster-track conveyor system now used on panel, final assembly, fuselage and engine lines throughout the plants of the Airplane Division is able to carry very heavy weights. Because surface casters made of composition material picked up foreign substances from the floor, they were difficult to move, so the Curtiss V-caster-track conveyor with self-cleaning wheels was originated by Curtiss production engineers.

Dollies equipped with grooved casters ride on rails set on the floor as shown in Fig. 7. These rails are rolled steel channels of L-section. They are mounted on the floor in the position of an inverted Vee. Thus any foreign matter or small parts such as rivets slide off and automatically fall clear so they cannot obstruct movements of wheels on the track. Casters have a 90-degree cut in them so they ride the rails accurately.

The dollies roll evenly and easily along the leveled rails. Small builtup

Fig. 9. (Left)—Improved setup employs conveyors and two degreasing tanks. Now baskets can be loaded and unloaded conveniently at conveyor level

Fig. 10 (Above)—Final assembly lines for certain planes utilize the floor chain conveyor as shown here. Special dollies support the plane from the floor and are pulled down the line by being hooked into the floor chain. Electric motor and drive for the floor chain can be seen in the right foreground. Note overhead monorail system that covers entire floor area

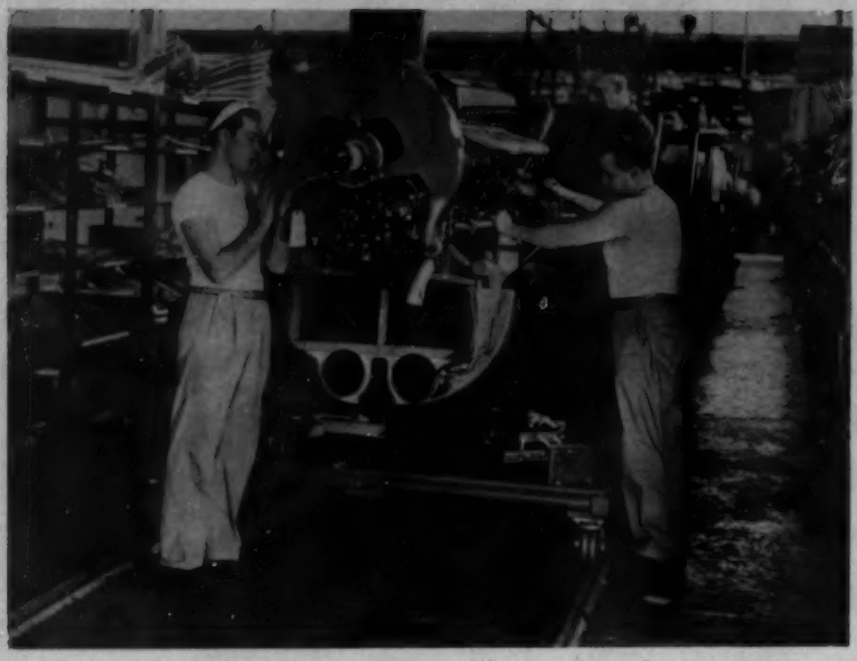


Fig. 11—Closeup of dollies with V-casters employed on engine assembly line

ramps at the ends of the conveyor lines and cleverly designed switchover sections make it possible for the dollies to roll from the floor to the conveyor and from one conveyor line to another with a minimum of effort. Establishment of work stations along the V-caster-track speeds actual construction. As the conveyors converge in the final assembly department, finished subassemblies are joined to make complete aircraft.

Track layouts vary from a simple straight line to multiple-circuit figure-8's and other complicatd arrangements. Fig. 6 shows a portion of a typical system. Note here that A U-bend is employed in a double-track with other return crossover sections at intermediate points (such as at left in Fig. 6) as well as at the track and at right in Fig. 6. Note, too, provisions for air and electric power lines which pass under the tracks to work stations.

Fig. 6 shows a work station in a line for construction of wings for "Warhawks". Precision wing-assembly jigs move down the production line every 40 minutes. Such jigs insure accurate construction at top speed. V-caster panel-assembly dollies convey wings to work stations and deliver wings directly to final assembly. Closeup Fig. 6 shows the end of the panel-assembly conveyor. Cross-track switches are used to reverse the work at any point on the line.

SO3C-1 "Seagull" fuselages are also assembled on a V-caster conveyor similar to that used in panel assembly. This permits placing of ships side by side, saving space. It also makes room for more mechanics and makes the inspection job easier.

P-40 fighter fuselages move on dollies with flat-tired wheels. They are kept in line by rolled steel sections which act as floor guides. Work stations and parts bins are placed at intervals along the line. Fuselages go to the final-assembly line where they are mounted on V-caster dollies.

A V-caster-track system is also used for engine installation. Fig. 11 shows a close-up of a line of power plants for P-40 fighters. The conveyor line moves parallel to fuselage and wing-assembly lines, converging at final assembly, where the ships are finished. The conveyor frame which supports the engines in Fig. 11 until they are ready to be installed in the fuselage is built up of welded steel tubing. Dolly in Fig. 7 is also welded from standard rolled steel sections.

Twin-engine AT-9 "Transition" trainers are assembled on a continuously moving block-long line as shown in Fig. 10. The assembly dollies are high enough to permit complete installation and testing of retractable landing gear, as can be seen by examining Fig. 10 closely. Work stands are pulled along with the ship. The wheel dollies on which the planes are mounted are moved down the line by means of a powered floor chain, whose motor and drive can be seen in the foreground of Fig. 10.

Curtiss "Commandos", one of the world's largest twin-engined transports, move down a similar conveyor on their final assembly line.

Thus each Curtiss ship is assembled on a movable dolly. Some roll on special tracks, some along the floor. In the Missouri plant, the dollies are attached to a power-driven chain, which moves the ships from station to station until they roll out the back doors ready for Uncle Sam.

Deadly P-40 fighters roll down production lines next to the huge Curtiss "Commandos". Swift scout observation planes roll down beside production lines of deadly "Helldivers". So "keep 'em rolling" has a special significance at Curtiss-Wright.

Shiftograph Tells How To Rotate Work Shifts

By simply turning a dial, a manufacturer using the Shiftograph, an instrument designed for use as a perpetual work shift schedule, can tell at a glance what shifts certain crews will work, the days they work, and their days off.

The instrument, developed by George S. May Co., Chicago, provides for several different plans of rotation wherein all employes are treated alike, for they share equally in desirable and undesirable work shifts. As a contribution of the war effort, the company is distributing more than 150,000 of these instruments free of charge.

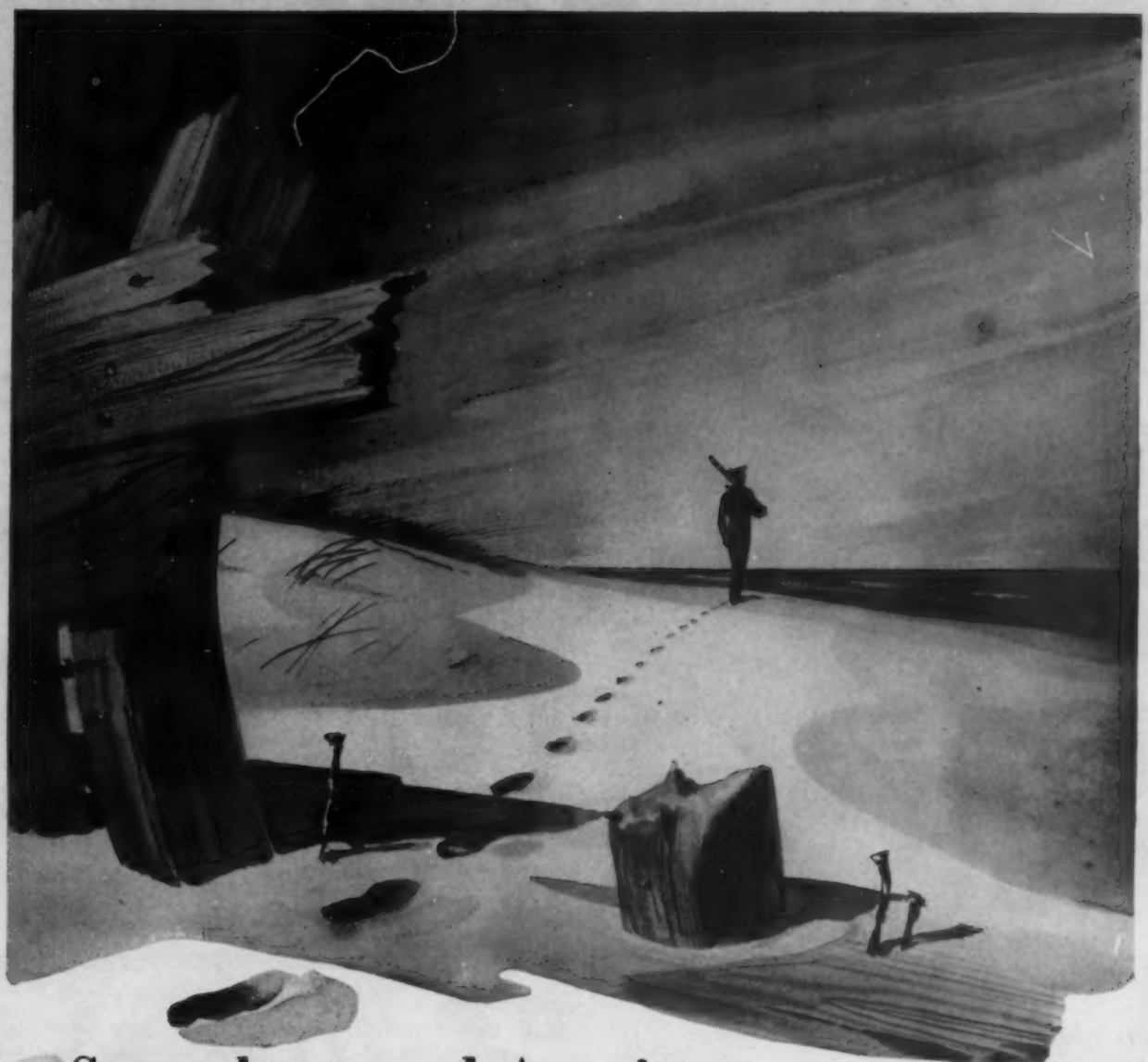
Paper Covering Protects Metals Against Corrosion

A new greaseproof, noncorrosive paper developed recently by Sherman Paper Products Corp., Newton Upper Falls, Mass., is reported to protect highly finished metal parts against corrosion. Called V-26, it is said to eliminate multiple wrapping operations at point of use, thereby also permitting substantial savings in time.

The new product, which meets all government specifications, was developed by Sherman engineers working in conjunction with the armed services and war industries, being widely tested in a diversified group of factories, including aircraft, automotive, truck, tank, and other types of ordnance factories.

Multiple wrapping operations are eliminated by combining two protective laminations in one paper. The inner ply provides a greaseproof barrier for the retention of corrosion-preventives used on metal products, while a strong outer ply protects the greaseproof membrane against damage in transit.

Both laminations are noncorrosive. Both are creped for greater flexibility in wrapping, with a dead-limp folding quality. The paper is offered either with an outer film of wax that provides a self-sealing surface, or uncoated where the self-tack quality is not needed.



Steps that guard America

He walks alone. His footsteps, plodding down some unnamed, silent beach, are a trail of protection between you and our Axis enemies.

Within the nation itself, there's a guardian's job we all can share. By caring for our tools and equipment, we make them last longer . . . and so save vital metals, and time, for greater war production. Storage batteries, for instance, last longer when you follow four simple rules of conservation. Obey them and you hit the Axis. Buy to Last and Save to Win!

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STEPS THAT GUARD BATTERIES!

1. Keep adding approved water at regular intervals. Most local water is safe. Ask us if yours is safe.
2. Keep the top of the battery and battery container clean and dry at all times. This will assure maximum protection of the inner parts.
3. Keep the battery fully charged—but avoid excessive over-charge. A storage battery will last longer when charged at its proper voltage.
4. Record water additions, voltage, and gravity readings. Don't trust your memory. Write down a complete record of your battery's life history. Compare readings.

If you wish more detailed information, or have a special battery problem, don't hesitate to write to Exide. We want you to get the long-life built into every Exide Battery. Ask for booklet Form 1982.

Wire Rope Recommendation Approved by Industry

A simplified practice recommendation for wire rope was recently approved for promulgation, effective from Feb. 15, according to the Division of Simplified Practice, National Bureau of Standards, Washington.

Known as R198-43, it lists sizes, construction, grades and breaking strengths for most tonnage of wire rope. It was developed by engineers of the wire rope industry to serve as a war-time conservation measure and guide for post-war practice.

The program concerns principally stock items. It does not go into particular end-uses. Special purpose ropes will be furnished by manufacturers only upon demonstrated necessity, it was explained.

The plan is said to reduce varieties from 973 items to 643 or 33.9 per cent. In the four predominant rope constructions a 48 per cent reduction was achieved, or 182 items instead of 352.

Machining of Nonferrous Metals Detailed in Booklet

Cutting speeds, feeds, tool rakes and clearances are suggested for basic machining operations in a new 32-page booklet offered by American Brass Co., Waterbury, Conn., to assist plants machining copper, brass, bronze and nickel silver.

Entitled "Machining Copper and Copper Base Alloys," the publication discusses cutting tool materials including carbon steel, high speed steel and tungsten carbide tipped cutters. Machinability ratings, tables of compositions, physical constants and physical properties on more than 40 copper base alloys also are included, from free-cutting brass to copper, the tough bronzes and copper nickel alloys.

Airco Issues Chart for Oxyacetylene Flames

Prepared particularly for guidance of new welders, the new chart for oxyacetylene flame adjustments being distributed by Air Reduction Co., 60 East Forty-second street, New York, is said to be welcomed even by "old hands".

The chart shows natural color photographs of five fundamental flame adjustments: Acetylene burning in air, a strongly carburizing flame, slight excess of acetylene flame, neutral flame and an oxidizing flame. Being completely graphic, it conveys the proper appearance of the various welding flames faster and more accurately than any amount of descriptive instruction. The chart is described as a vitally important guide for every welder, for even the best manipulative welding skill is wasted unless flame adjustments are correct.

Special Broach Solves Keyway Chip Problem

Difficulties encountered in broaching a blind keyway in a shaft, and coupling to a tolerance of 0.0005-inch, led Charles Bogue, a machine operator at General Electric's Schenectady Works, to suggest the use of a "split broach" to solve the chip damage problem.

Initially, GE reports, a 2-faced broach was developed for the job—one side having right-hand teeth and the other left-hand special teeth. The opposing angles of cutting equalized the strains and facilitated a straight cut. A space was left at the tip for the accumulation of chips which could be blown out after the broach was withdrawn.

It was found, however, that chips from the back teeth damaged the front teeth as the broach was withdrawn, and a new broach had to be used after about every dozen or so cutting operations.

The broach suggested by Bogue has a shank machined to the size of the keyway, with one side cut away to accommodate a broach face. At the end of the cutting operation this shank is withdrawn, leaving the broach face loose in the keyway for easy removal. Two passes are made to cut each keyway, but there is no damage from chips in removing the broach, and deterioration is negligible.

Straightening Parts

(*Concluded from Page* 74)

normalizing heat. Any necessary rounding up can be done by a screw mounted horizontally on a straightening bed. If the cross section of the ring is relatively thin, such as ⅛-inch or less, blocks which fit an arc of the ring should be used. Otherwise pressing on too narrow a section will tend to cause flat spots.

Rings made of water hardening steels can be flattened after hardening by using a shim under each end of a high area and pressing the high section down. The same procedure can be used on oil-hardening steels but they will move easier if some heat (300 to 400 degrees Fahr.) is left in from the quench.

Parts that are too intricate for a water quench, even though they are of a water-quenching steel will respond to pressing while hot if they are dropped in temperature from the carburizing heat to 1500 degrees Fahr. (as previously mentioned), then oil quenched and removed from the quench hot. A better treatment, however, is to allow parts to cool from carburizing heat, normalize, then reheat in compound or boneblack and oil quench from 1500 degrees Fahr. This treatment will give a good file hardness but with low rockwell hardness (50 to 55).

In those plants fortunate enough to have a controlled atmosphere furnace which will keep the work clean—and not decarburize it, many intricate jobs, although of water-hardening steel, can be oil quenched to full hardness with consequent minimum distortion. Oil quenching of such work is not possible when scale has formed on the work during reheating—with resultant slowing down of the quench.

The removal of carburized surfaces before hardening will often lead to serious warpage. Any machine part of such design that warp is a factor should be machined evenly on opposite surface so that a high physical strength is not built up in hardening one side only. Where the case is machined away on one surface only, the part is sure to warp. Straightening under these conditions is difficult. Many such parts have been ruined where a little consideration of the uncarburized area would have saved the day. To avoid this difficulty, either machine all sides alike or recarburize the machined portion.

Very thin sections which will warp of their own weight when heated to the regular carburizing temperatures can be carburized at 1500 degrees Fahr. and oil quenched. This will give a high hardness due to the increased carbon content of the case obtained from a lower carburizing temperature. A longer carburizing cycle is then necessary. Case depth of 0.015 to 0.020-inch can be had in about 8 hours. Straightening of long thin strips can then be done cold with the aid of a rawhide mallet and a lead block.

As can be seen from the above, the most important considerations are the condition of the core and the application of the proper straightening method for the particular steel being handled—whether water or oil-hardening type.

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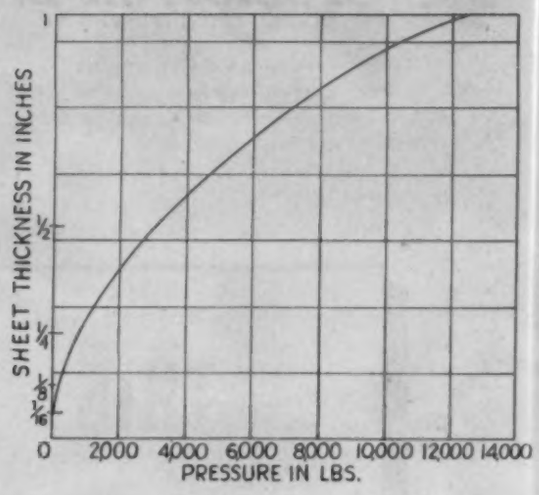
3P

Metallurgy of . . . Spot Welding



By HAROLD LAWRENCE

This is the first in a series of articles presenting in simplified form metallurgical factors involved in resistance welding applications and written to afford a basic understanding of the process. The author is a metallurgist and engineer in charge of production and control work for a large manufacturer in the welding industry

THE METALLURGY of spot welding differs from that of the other weld-processes primarily because of the greater speed in reaching the welding temperature and in subsequent cooling of the weld and adjacent neat-affected zone.

Fundamental metallurgical studies have demonstrated that controlled heat cycles are the clue to consistently good welding practice. Or stated another way, skillful use of welding heat promotes sound welds without impairing the desirable physical properties of the heat-affected parent metal.

In Fig. 4 the spot welding of steel is illustrated. Copper alloy welding tips are used to combine low electrical resistance with high heat conductivity. This copper alloy is chosen to give adequate structural strength to withstand the welding pressures while at the same time possessing the desired electrical and heat conductivity attributes. The steel being welded has low electrical and heat conductivity, relatively speaking.

The heat generated in this electrical system is represented by the formula $H—I^2RT$ where H is the total heat, I is the current R is the resistance and T is the time. Forgetting the other complex factors that influence this simple relationship, the formula may be applied to the spot weld of Fig. 4.

Why does the weld take place at point 4 between the two pieces of steel rather than at point 3 between the steel and the electrode tip? The answer lies largely in the comparative electrical resistance of copper and iron. While copper has a *resistivity* of 1.7, iron has 9.8 or almost six times as much. Therefore, a given welding temperature might be reached in the steel in 3 cycles of welding time while 18 cycles would necessarily elapse to reach the same temperature in the copper. As the resistivity figures are for pure copper and pure copper and pure iron, the difference that exists in actual practice is even greater, steel actually having about eight times the resistivity of the copper alloy electrode tips commonly encountered.

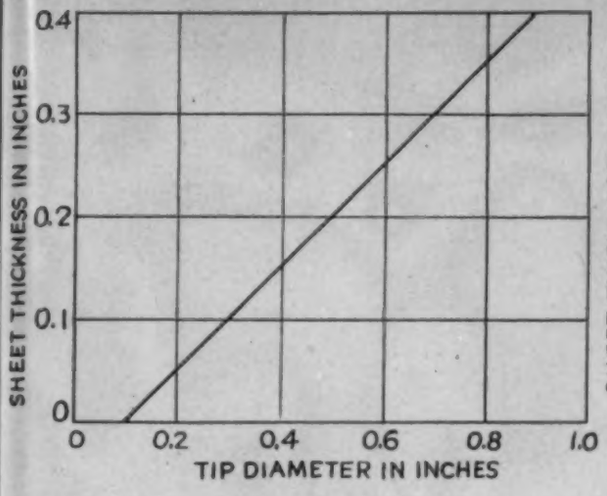
The factor of heat *condictivity* is also important. Comparing the heat conductivity of pure copper and pure iron, copper has a value of 0.923 while iron is only 0.19; thus copper has almost five times the heat conductivity of iron. This means that heat generated at the steel-to-steel contact surface is carried away much more slowly than from the steel-to-copper contact surfaces.

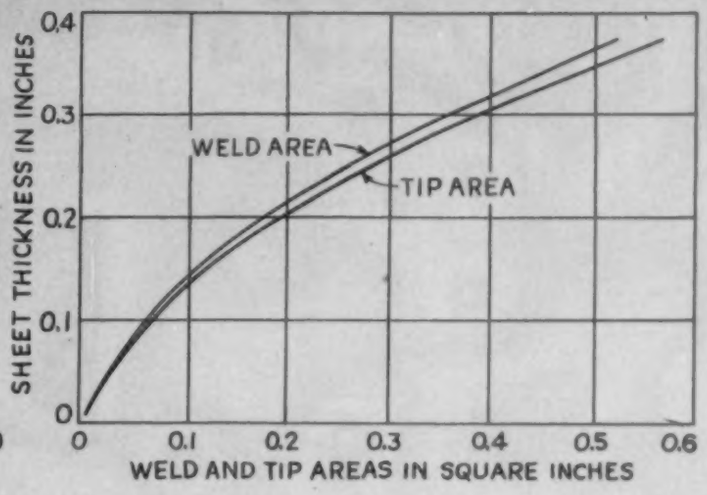
Fig. 5 shows the instantaneous temperature conditions that exist in and around a spot weld. The weld nugget is just below the temperature of molten steel. The heat-affected zone is in the neighborhood of the transformation temperature as is the contact surface where the steel meets the copper tip. And the steel a short distance away from the weld is below the temperature of boiling water; as is the tip body.

Of course the considerations that have been reviewed to this point have been overly simplified. The films of dirt, oxide and scale that exist on metals increase the resistance appreciably. Pressure is applied to the tips as a means of reducing the contact resistance which is roughly inversely proportional to the applied pressure at the points of contact. Since the physical strength (compressive strength here) is lower for some metals when in the heated state, an additional follow-up pressure is needed to make a sound weld. This is true of the aluminum alloys, for example.

A spot weld is accomplished by means of heat and pressure. Both of these elements are worked out empirically to produce welds of satisfactory strengths. Current, resistance, time and pressure are recognized as the fundamental variables.

High current with all other variables remaining unchanged bring about spot welds in extremely short time intervals. For this reason high currents are sought as a means to increase production rates.





Left to right, above—Fig. 1—Additional pressure recommended to overcome buckling depends upon thickness of material being welded. Fig. 2—Relationship between sheet thickness and electrode tip diameter in spot welding. Fig. 3—Weld area and tip area as a function of sheet thickness

But high currents require costly equipment and introduce large power demands. And with a fixed pressure, there is a practical limit to current density. Above this limit there are explosions of metal sometimes called "spitting" or "squirting" which result in poor quality welds. A current density just below this point produces the best welds. With high currents in the right range, welds are made quickly. Quality is good and heat conduction into the parent plate and tips is low.

The place of electrical resistance in spot welding is obvious. For resistance, particularly the contact resistance, make the spot weld possible. If there were no electrical resistance at all, there would be no power expanded and no heat generated and consequently no weld made. At the present time much research work is being done on the many aspects of resistance, including the influence of pressure, surface condition, skin effect and so forth. It is expected that all these factors will ultimately be reduced to definite scientific constants.

Time constitutes a well recognized variable. To avoid overheating of work and electrode tips, current application should be as brief as possible. Most spot welding is controlled by precise electric instruments that permit current flow for the exact number of cycles. On-the-spot pull tests are used in many industries, among which the aircraft industry with its precise quality control is a foremost example. These tests afford a valuable check on machine and electrical setups before production work is begun. By such tests the factors of current, time and work resistance as well as pressure, contact resistance, conductance, etc., are correlated with the shear strength of test welds in the actual material to be welded.

Consideration must be given to the size of a spot weld, for the strength of a weld is proportional to its size. But the maximum size of a single spot is limited by the practical effects of current and pressure. Too, a large spot weld, neglecting for the moment the tremendous heat release, would require a machine so large as to be uneconomic.

On the other hand, tiny spot welds are impractical because they do not possess much strength. It would take too many of them to finish a joint. And the indentation caused by the small diameter electrode tips used would be yet another objectionable feature. In low carbon steel most authorities have agreed that the tip diameter should correspond to the following formula: Tip diameter $= (0.1 + 2t)$ inches where t represents the thickness in inches of one thickness of the material to be welded.

This tip diameter is actually the diameter of the contact area at the conclusion of the welding operation. Fig. 2 demonstrates the linear relationship between sheet thickness and recommended tip diameter for low carbon steels.

Small welds in extremely thin sheet have about the same area as the tip. However, as the thickness of the material being welded increases, the area of the weld lags somewhat behind. This relationship is depicted in Fig. 3 which compares the areas of tips and welds as a function of the sheet thickness.

The force required to overcome buckle[3] to bring together the surfaces to be welded is in addition to the welding pressures. This force increases rapidly with increased thickness of the sheets or plates being joined. The result is to place a distinct burden upon the welding of thick material. For ultimately a thickness will be reached that is beyond the limit of available tip strengths in materials of desirable conductivity. Fig. 1 portrays the relationship between the suggested pressure to overcome buckling and the individual sheet thickness of the two pieces being welded.

Up to this point many of the elementary considerations in spot welding have been reviewed to provide a background for the metallurgical considerations which follow. The whole subject of spot welding metallurgy is simply one

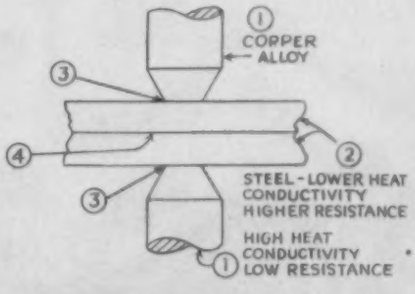
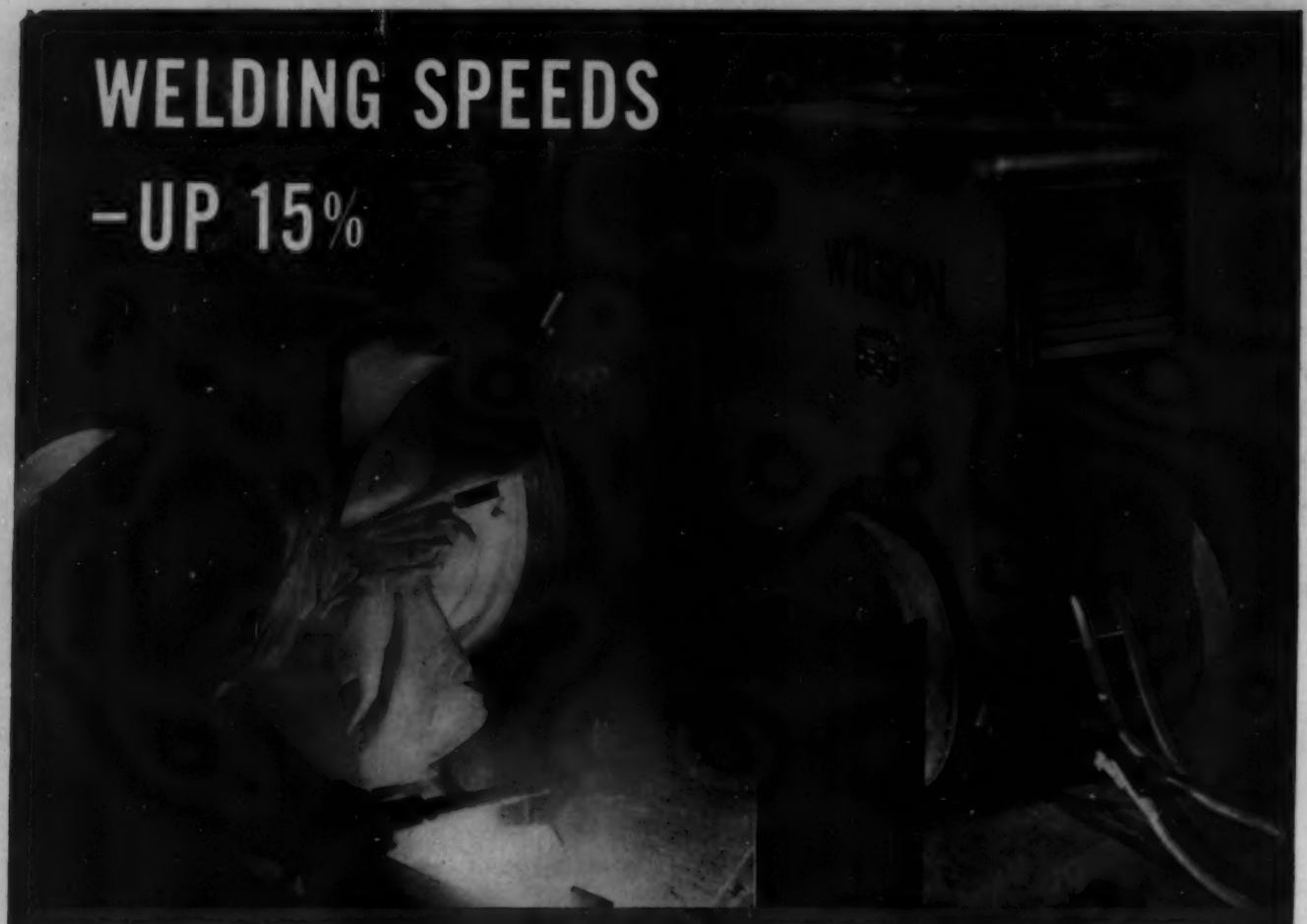


Fig. 4—Elementary considerations in spot welding

WELDING SPEEDS —UP 15%



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WITH THE NEW WILSON "BUMBLE BEE" AC WELDING MACHINE

You can step up welding speeds 15% and better with the new Wilson "Bumble Bee" AC welding machine. This new AC welder permits use of larger electrodes and higher welding currents which provide faster metal deposition and fewer electrode changes. High quality welds are assured because there's virtually no troublesome "arc-blow" even when welding in deep grooves, corners, or similar difficult locations.

Power costs are reduced with a Wilson "Bumble Bee"—to almost 50% over DC machines of the same rating. Moreover, maintenance is easier because there are no heavy rotating parts requiring frequent attention.

Since the Wilson "Bumble Bee" uses only half as much copper and electrical sheet steel as DC machines, faster deliveries can be made at the present time. The "Bumble Bee" is made in two sizes —300 and 500 amperes. For full details on this new, improved AC welder, write to Wilson Welder & Metals Co., Inc., 60 East 42nd St., New York.

FOR HIGH QUALITY AC WELDING USE THE WILSON 530 ELECTRODE

A perfect teammate for the speedy Wilson "Bumble Bee" is the all position AC electrode—Wilson No. 530. This electrode produces high quality welds to meet the following specifications:

AWS Filler Metal Specification E6011
Navy Bureau of Ships, Specification 46E3, Grade III, Class 1
A.S.M.E. Boiler Code, Paragraph U68

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of understanding the metals being joined and the distribution of the heat required to bring about the fusion desired.

Low carbon steels, generally accepted to be those steels with a maximum carbon content of 0.20 per cent, offer no metallurgical problems at all. Once the correct spot welding cycle has been established, there is little else to cause difficulty. The heat introduced by the current melts the steel and allows fusion to take place. The cooling cycle finds the metal solidifying and going through the austenite-pearlite transformation. Only the ductile pearlitic end structure is possible with all practical welding conditions. To produce brittle structures in either the weld metal or the heat affected parent plate would require such excessively high cooling rates as to be beyond the realm of possibility.

However, the ease with which the low carbon steels may be welded does not imply that the welding of higher carbon steels may be done with the same freedom from metallurgical pitfalls. On the contrary, the very nature of the spot welding process has stood in the way of its application to many *hardenable* materials. Rapid cooling rates are an integral part of the spot welding method. Production demands quick completion of individual spots. Thus the hardening tendencies of some steels such as certain high carbon steels were incompatible with ordinary spot welding practice. Or the heat cycle needs of the individual weld spot were anathema to the steel.

Metal Has Increased Resistance

As was pointed out in the beginning of this article, current and resistance provide the welding heat. The success of the spot welding process is intimately linked with the fact that the greatest resistance is located at the contact face between the two pieces to be welded. And as the current flows, this area becomes hotter and hotter. The heated metal has an increased electrical resistance which aids in localizing further development of heat at the spot.

At the same time heat is being developed at the electrode tip. But the relatively small resistance at the tip together with its greater area means that the best buildup here is much less than that at the spot. Likewise there is a temperature increase at the contact surface between the tip and the steel. Also there is the heat evolution caused by the resistance of the steel through which the current is flowing to the spot.

After a brief interval of time, the region of the spot melts and the automatic controls shuts off the current. At this moment there is a molten weld nugget entirely surrounded by cold, comparatively speaking, steel and copper. For all practical purposes the situation is analgous to that in which the blacksmith has finished heating a tool and is plunging it in water. Because the hot nugget gives up its heat to the surrounding metal very quickly, the austenite, forced to obey definite physical laws, transforms not to ductile pearlite but rather to hard, brittle martensite. The effect is the same as a drastic quench.

Throughout this discussion, reference has been made to the need for short welding cycles as essential to attainment of good output rates. Neglecting the question of production for the moment, the problem of the austenite transformation may be studied by itself. As Dr. Bain has demonstrated so clearly, the transformation products are determined by cooling rates. And cooling rates are a function of temperature differences. That is, an ice cube takes some time to melt in ice water while it disappears quickly in hot water.

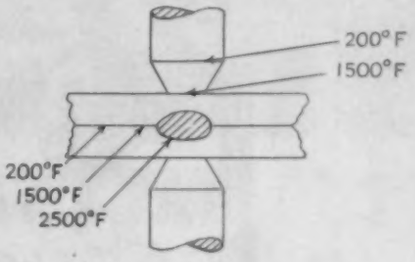


Fig. 5—Instantaneous temperature conditions in a spot weld

Suppose, then, that work output is of little consequence as compared with weld quality. Lower current and longer time will bring the temperature of the weld nugget, the parent metal and the electrode tip closer together. The temperature gradients are reduced by conduction. At length a condition may be established where the weld austenite and the hot unwelded portion next to the weld which has become austenitic as well may cool at a rate slow enough to permit the transformation to pearlite.

Apparently the problem is solved. Yet, actually, it is not for such slow heating brings the temperature of the electrode tips to the point where they lack structural strength. The applied pressure then results in distorting or flattening out of the tips, called "mushrooming", and short tip life. Too, the increased area of the mushroomed tip leads to a wider current path and a lowered current density. Very likely the next weld will be poor because the current and the time values are now different from those originally established for the definite tip size which no longer exists.

The steel, too, has been heated over a greater area. It has been subjected to pressure while in a weakened state. As a result, it has been upset. And the marking of the surface has become objectionable. Now, small bits of copper alloy will be found embedded in the surface of the steel where the tip has become partially welded to the steel.

Spot Welding Not Impossible

When these basic factors are considered in detail, it is realized that *more than an increase of time at a lower current setting is required to solve the problem.* The handicaps imposed on spot welding by the temperamental attributes of hardenable steels must be acknowledged.

However, the spot welding of hardenable steels is not impossible. The amount of such welding activity has been increasing at an accelerated rate. The introduction of the NE steels has given added impetus to the welding of steels that have heretofore been thought of as possessing limited weldability.

NE steels were developed to conserve our supply of critical alloys such as chromium, nickel and vanadium. These three elements have a limited hardening effect. (See "Welding Substitute Steels", STEEL, Aug. 31, 1942, p. 60). And, as is well known, the NE steels are built around carbon, manganese and molybdenum which head the list of steel hardeners. Thus the increased use of spot welding must mean that controlled heat cycles are possible after all. *And so they are.*

For a moment, let's return to the blacksmith who has quenched his steel in water. His purpose is to establish a rapid cooling rate designed to produce martensite in a hardenable steel. But he also has to meet a ductility requiremen in the finished tool, otherwise the tool would break. So he tempers the tool by reheating it, polishing it with a piece of emery and holding it until the temper color indicates the desired degree of tempering. Now he has a tool which is hard enough for the application and tough enough as well.

The same thing is being done in spot welding hardenable steels. It represents a distinct advance in the spot welding art. The invention of the Temp-A-Trol forge welder and the application of refrigeration to electrode tips have supplied the needed equipment. (See "Refrigerated Tips", STEEL, Aug. 24, 1942, p. 62.) Through the introducsition of this novel equipment, too spot

(*Please turn to Page* 108)

INDUSTRIAL EQUIPMENT

Blue Print Printer

Peck & Harvey, 4325 Addison street, Chicago, is marketing a new fast Spee-Dee printer for making blue prints or black and white prints. It is said to do such jobs in about ½-minute.

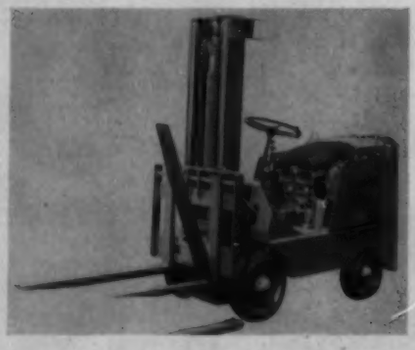
A portable table model, the printer

can be plugged into any standard electric outlet and is extremely easy to operate. It is being offered in two sizes—for prints up to 12 x 18 and 18 x 24 inches.

Actual printing surface on both machines is oversize. This prevents crowding of prints, overlapping or blurred edges. Printing on a curved glass surface gives good contact without inconvenience of wrapping the prints around a cylinder. Tracings, drawings, letters, invoices, or any written or printed matter can be duplicated on the machine, the company states.

Extension Adaptors

Towmotor Corp., 1226 East 152nd street, Cleveland, announces new fork extension adaptors for industrial trucks which increase lift truck load range. Quickly and easily attached, they make it possible to extend fork lengths safely as much as 24 inches in only 15 or 20 seconds. Skids or pallets, therefore, no longer need conform to a minimum



size range to be efficiently accomodated by the same lift truck. When adaptors are held vertically, the eye at the bottom of each is inserted over forks. The adaptor is then slid back to the bend of the forks, and lowered. It automatically "locks" in position to prevent forward or backward sliding, while side flanges prevent any sideway slipping.

Portable Floodlight

Steber Mfg. Co., 2451 North Sacramento avenue, Chicago, reports the addition of a new portable floodlight to its line of Circulites suitable for war plants, airplane assembly and maintenance hangars, shipyards, repair shops, loading and unloading areas, yards, construction jobs and many emergency uses.

The floodlight assembly is adjustable in a vertical range from bottom to top of the 6-foot pipe standard at any angle and horizontally at 360 degrees radius. A cast iron circular base of 20-inch diam-

eter provides stable footing yet permits easy portability. The 12-inch reflector is chromium plated for high reflecting efficiency.

Test Bench

Hydraulic Machinery Co. Inc., 12825 Ford road, Dearborn, Mich., is offering a new model T-102 hydraulic test bench that can be used by two operators at one time. In an emergency, it allows a third operator to work off of the accumulator hook-up.

Principally used for checking aircraft tubing, the unit features a variable test pressure of 0 up to 10,000 pounds per square inch, and a variable delivery pumping unit of 0 to 12 gallons per minute. The accumulator is used for checking aircraft valves and can be operated at a maximum test pressure of 1000 pounds per square inch. It is an air-oil type accumulator — the air part of it being charged by a small hydraulic-driven high pressure air compressor. An enclosed unit, it can be used to

charge the accumulators on the planes themselves. Controls of the test bench are easily accessible from the outside.

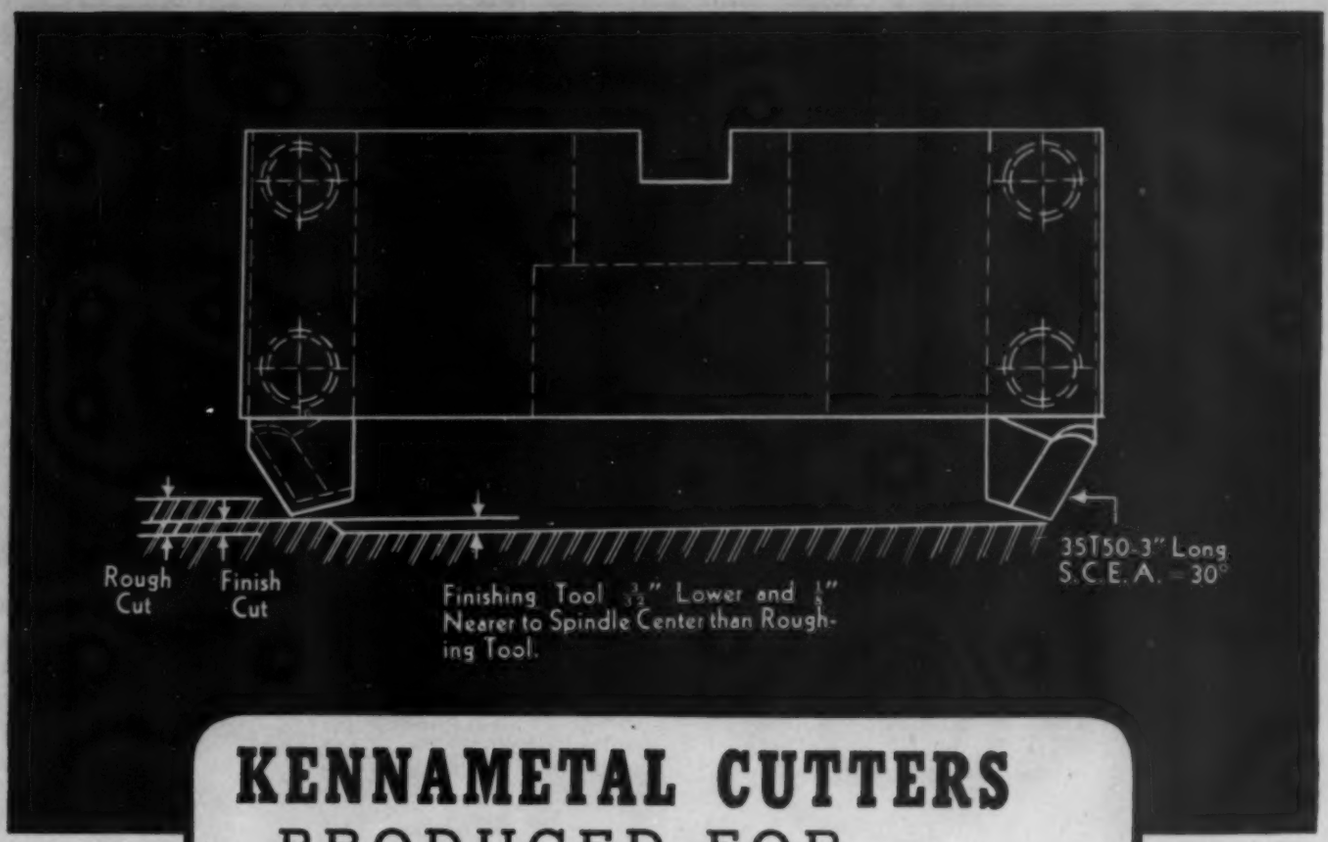
Air-Cooled Transformer

Eisler Engineering Co. Inc., Newark, N. J., is marketing a new type air-cooled distribution transformer said to be particularly suitable for use in hazardous locations. Since no liquids of any kind are used in connection with the unit, fire and explosion hazards are removed, and the unit may be placed anywhere indoors without the expense of building a protective vault.

Inspection and maintenance also are reduced to a minimum due to absence of such devices as valves, cooling tubes, liquid level gages, gaskets and liquid. Additional advantage is the ability to place the air-cooled transformer near its load center reducing heavy copper secondary runs, thereby improving voltage regulation and increasing operating efficiency.

The new unit, the company reports, is lighter and more compact than its liquid filled counterpart. This facilitates handling when installing and requires

less floor space. Since no headroom is required, installation can be made where ceiling is low or on platform above working area, near ceiling, leaving floor space for production purposes. Transformers are being built up to 500 kilovolt-amperes in voltages to 4800 volts,



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PRODUCED FOR
faster Milling

Today in milling operations, as well as in turning, boring, and facing, one of the basic factors is speed. Single and double bladed KENNAMETAL milling cutters will give you that increased speed through quick changing of blades and eliminating accurate setting procedures. It requires only a moment to loosen the dull blade and replace it with a sharp KENNAMETAL cutter—this is done while the head remains in the milling machine. Removal of the head from the machine is not necessary as with the use of multi-bladed heads.

Accurate setting is not required since the blades are ground separately on a simple carbide grinder which uses a cup wheel and adjustable table to give the blade minimum clearances, proper rakes, and a small radius.

The use of a one or two blade head, in contrast to heads of many blades, eliminates the possibility of damaging the cutter or job by a jar when another blade enters the cut. KENNAMETAL cutters are run at very high speeds to give 300 to 600 ft./min. peripheral speed with the substantial table feed of .004" to .008" per tooth, depending upon the nature of the material being machined. This results in sufficiently rapid table feed despite the fact that only one or two cutting blades are employed.

KENNAMETAL single and double bladed cutters will increase the speed of your milling operations. Write today for the latest KENNAMETAL Catalog which contains tool designs and set-up diagrams for milling operations.

*INVENTED AND MANUFACTURED IN THE U. S. A.

McKENNA METALS Co.
200 LLOYD AVE., LATROBE, PA.
Foreign Sales: U. S. STEEL EXPORT CO., 30 Church St., New York
Exclusive of Canada and Great Britain
Trade Mark Reg. U. S. Pat. Off.

KENNAMETAL
THE All American CARBIDE

single phase, three phase and Scott connected three to two or two to three phase in one unit.

Low Headroom Hoists

Northern Engineering Works, 2615 Atwater street, Detroit, announces a line of low headroom hoists for operation on various types of special section monorail track systems. These, mounted on trolleys designed to fit the monorail track system used, are equipped with the Hi-Lift design which provides maximum hook lift, yet have the drum parallel to the tramrail track.

They are being built in capacities

from 1 ton up. The line includes both cab and floor-controlled types. The hoist frame is of welded rolled steel plate. Gearing is machine cut, heat treated to a hardness and depth to prevent wear. Heavy duty roller bearings and splash lubrication assure low friction load and freedom from wear.

The mechanical load brake of the hoist can be reached and friction surfaces replaced without removing the hoist gear case cover. A split gear case provides easy access to gearing and bearings.

Research Filter

R. P. Adams Co. Inc., 55 Chicago street, Buffalo, is offering a new Poro-Stone research filter reported to be ideal for experimental work. A compact single tube unit, it is specially suited to industrial research departments requiring small pilot plant service for test purposes.

Due to its simplified construction, the filter is accessible for inspection at all times and can be quickly cleaned. It is adaptable to practically all types of noncorrosive filtration. A wide choice of filter mediums gives this WJR-1 model unusually complete coverage of clarification operations, it is said.

The unit can be installed for back-

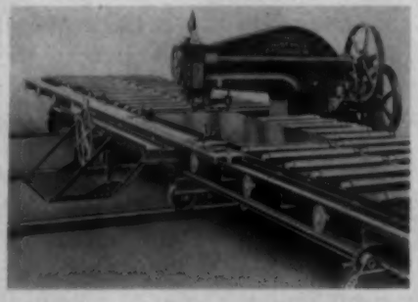
washing with the liquid being filtered or with clean filtered water from an outside source.

Plate Punch and Table

Thomas Machine Mfg. Co., Pittsburgh, is offering a new high-precision plate punch and table for punching all kinds of plates—ship, tank, boiler, car plates, etc. It is reported to handle plates up to 8 feet wide and 30 feet long.

Punch part of machine is of standard type, equipped with floating punch stem and electrically controlled clutch. It has enough capacity and depth of throat to suit most requirements. The steel table consists of a rigid cross-braced frame carrying rollers for supporting plate to be punched. Plate rollers are mounted on antifriction bearings and are of long tubular construction, permitting handling of narrow plates.

The first rollers on either side of the punch are mounted on springs which hold the plate clear of the die. The plate is attached to the unit by means of quick-



acting clamps to a heavy channel section carriage, roller bearing mounted, running lengthwise of the table and controlled by a rack and pinion, with handwheel located on operator's platform. This feature is said to insure positive movement of the plate longitudinally, entirely independent of friction, and eliminates difficulties encountered with friction drives when plates are warped.

A further advantage is that since the plate is clamped to a traveling carriage which moves in alignment. A spacing attachment may be installed which permits accurate and rapid spacing of holes longitudinally. Table is supported on track wheels set at floor level. Latter are mounted on antifriction bearings, moving the table by means of pinions engaging racks on each of the four tracks. The table is held on its transverse movement by one track only, the top of which is in the form of an inverted V.

Controls of the unit are conveniently located directly in front of the punch. The two handwheels at the operator's platform, which moves back and forth with the table, give operator complete and positive control at all times. The punch clutch is electrically controlled by a foot push button.

Swivel Caster

Rose Mfg. Co., 12400 Strathmoor, Detroit, announces a new heavy duty all steel swivel caster which features in its design a drop forged base plate with king pin integral. The king pin is a

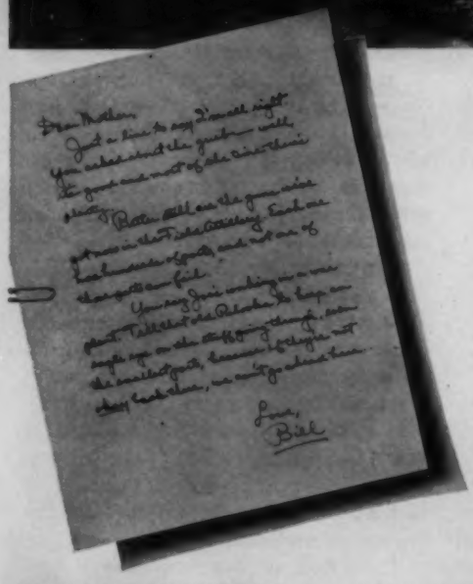
Timken thrust bearing. Fixed on the axle is a hardened nonturning spanner bushing and a Hyatt roller bearing.

The caster swivels on a ⅜-inch chromium steel ball bearings that ride in removable steel races. While Hyatt bearings are standard in the wheels, oilites or any other special bearings are furnished.

Dust Collector

Aget - Detroit Co., Book building, Detroit, is introducing a new, entirely self-contained, table dust collector for collecting and storing dust from one or more flexible shaft grinding, buffing, small band sanding or metal spraying operations.

Called Bench - Kop, it employs the



WAS THE 72nd YOUR BABY?

THE SMALL metal parts many of us are working on today may be in Tunis next month. If they don't do their job, boys like Bill may never cross the ocean again.

Parts like EMPIRE bolts and nuts, for example. Shipped by carloads, each one must fit, tighten easily, stand up under fire. They must move *fast* — or war equipment will move slowly.

Here, at R B & W, machines of our own design are improving the strength of metal, cold-reducing Empire bolts, cold-forging the threads, cold-punching Empire nuts, repunching to insure perfect fit. To this inventiveness, we're adding *personal care* to make quite sure no weapon fails or waits because of us.

★ If you, too, are making vital "bits and parts", we'll send you posters made up from this ad—omitting any reference to us. They're free. Just write Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, N. Y.

RB&W *Making strong the things that make America strong*

RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY

company's standard motor-driven dust collector mounted as an integral part of the table and connected to a down-draft funnel. It requires no connection with a centralized system, or secondary dust collector. Built of wood wherever possible, the unit consists essentially of a wood table with a wood grille top, under which is installed a sheet metal funnel, which in turn connects to the intake of the 600 cubic foot per minute, model 600 collector. A baffle plate immediately under the grille permits recovery of any heavy pieces of metal, parts or tools which may be dropped.

The baffle also collects a considerable portion of the heavier dust and dirt. Its plate is arranged so greater portion of suction is along the two back sides of the table where, according to experience, the greatest suction is required.

A hand-hole clean-out in the bottom of the vertical piping provides an additional means of collecting dust and dirt before it enters the dust collector itself. A back guard of sheet metal, ex-

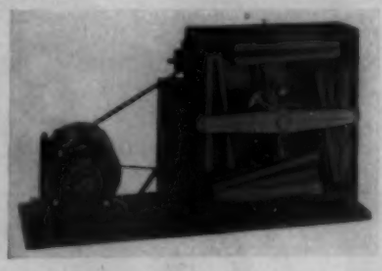
tending upward from two sides of the table, forms a barrier for heavy pieces of metal or abrasive thrown off from the grinding operation and also tends to concentrate the suction.

Vacuum Pump

American Automatic Typewriter Co., 614 North Carpenter street, Chicago, announces a positive-type vacuum pump for production and laboratory applications. Built in two standard sizes, it is supplied with individual electric-motor drives, or without motors for use with an available power source.

Pump employs four bellows mounted within square wood frame, connected to each other and to the pump outlet by a channel running through the frame. Bellows, which are successively expanded to exhaust air or gas from the equipment to which the pump is connected, are driven by a revolving shaft through connecting straps.

The shaft is V-belt driven at a relatively slow speed, approximately 200 revolutions per minute. Flexible sides of the bellows are of leather, as are intake and exhaust valves. Joints are gasketed by a sheet of neoprene cloth, and the frame or case has a black wrinkle finish. The larger of the two units



is rated at 15 cubic feet displacement at four inches of mercury.

Bellows are six inches wide, and pumps individually driven use a ½-horsepower motor. The smaller unit, rated at 17 cubic feet displacement at four inches of mercury, has 4-inch bellows and uses a 1/6-horsepower motor. Governors serve to vary their capacities, and to prevent excessive wear on parts. According to the company, the pump readily may be incorporated into the design of machines or equipment.

Plastic Electric Drill

Independent Pneumatic Tool Co., 600 West Jackson boulevard, Chicago, is now offering a new Thor plastic ¼-inch portable electric drill claimed to have more power per pound, greater strength and protection from shock and to be more compact, lighter in weight and

cooler to handle than any machine of previous construction. Plastic is used for the grip handle, field case and gear case of the drill.

Variable Resistors

Stackpole Carbon Co., St. Marys, Pa., is offering two new closed-cover, sealed variable resistors for performance under intensely humid or dusty conditions in either standard radio or high-frequency equipment. According to the company, a leakage resistance on the order of 300 megohms after 48 hours in 95 per cent humidity at 40 degrees Cent. is obtained in the type MG design.

Spacing of current-carrying parts is greater, and the surface insulation of the molded base is several times that of previous laminated-base units. The type LP resistor is now furnished with a dust-proof cover and is sealed effectively with a special compound to the point where resistivity from current-carrying parts after 48 hours of 95 per cent humidity at 40 degrees Cent. is five times that of the previous open-construction units.

The cover makes the resistor suitable for use in dusty or sandy localities. Both units incorporate a spiral connector giving positive noise-free contact between contacting head and center terminal.

Spot Welding

(*Concluded from Page* 103)

weld may be given the same heat treatment as the blacksmith's tool.

A weld is first made using the conventional technique. This is followed immediately by a controlled current application that refines the grain, eliminating the coarse structure formed initially. In the following and final step the weld is tempered or drawn below the critical transformation temperature. These operations follow the initial weld cycle under precise automatic control.

Since the tips are refrigerated, there is no mushrooming or tip pick-up. Since three distinct operations are performed in rapid succession, there is no serious holdup of production. And since the time at high temperature is not great, there is no undue deformation of the material being welded.

In spot welding, as in the other welding processes, metallurgical considerations must be understood. Higher speeds of welding place a definite emphasis on an understanding of the effect of welding heat distribution on the final structure obtained. But with the advent of new equipment designed to make due allowance for all primary metallurgical factors, the horizon for spot welding has become almost limitless.

The effect of this condition is certain to bring about further expansion of welding to speed the war effort and to provide new goods for consumer consumption when peace is assured. With purse strings tightened as a result of increased taxes, the prospect of better goods at lower unit costs as a result of new applications of spot welding is most reassuring.

SAVE TIME
TO SPEED VICTORY

★ BUY U.S. WAR BONDS ★

Write for our new Catalog No. 100C showing lathes for every class of work — engine lathes, toolroom lathes, and turret lathes.

SAVING TIME is of vital importance, for every second saved hastens victory and brings us that much closer to peace.

Time is saved and precious machine hours are gained on many operations through the use of South Bend Lathes. Their wide range of spindle speeds permits machining work with maximum cutting tool efficiency. Their versatility keeps setup time to a minimum — adding hours to machine output on short runs or when product specifications are frequently changed. Conveniently placed, smoothly operating controls contribute to an ease of operation that reduces fatigue and increases manpower efficiency.

Most important of all time-saving advantages is South Bend's dependable precision which assures maximum production even when extremely close tolerances must be maintained.

SOUTH BEND LATHE WORKS

South Bend, Indiana Lathe Builders For 36 Years

E
• Behind this letter "E" are years of experience and a plant geared to produce bolting to exacting specifications—for pressure, temperature and corrosion resistance. Erie specialized bolting is available in Alloy, Stainless and Carbon Steels, and Bronze. Consult Erie for bolting to your specifications.

Your Boss Is Our Boss . . .

Today we are both working directly or indirectly for Uncle Sam—so we understand how important it is to concentrate on first things first. Regulations and restrictions set up by our government point the course we all follow. It means many times that personal service that has been so vital a part of our business life and all business life, must give way, temporarily.

The new things we are learning about specialized bolting, coupled with our old time idea on service, will profit our peace time customers when business gets back to normal again.

Glass Gages

(*Continued from Page 71*)

are requisite. In this connection we might state that the boro-silicate formulas are among the hardest and most abrasion resistant. Too, their thermal expansion is only about a third or a quarter of the thermal expansion of most metals, including the carbon steels.

Some changes in gage design are necessary in order to achieve the greatest mechanical strength with glass. While the strength of glass in compression is usually in excess of 100,000 pounds per square inch, its tensile strength is only about 5000 to 15,000 pounds per square inch. Therefore where tensile strength is a factor these sections should be increased in size. Also all exposed edges must be beveled or finished to a radius to minimize chipping or breakage when dropped.

Glass manufacturers who have already furnished the Ordnance Department with gages include: Corning Glass Works, Corning, N. Y.; A. S. Heisey Co., Newark, O.; Fischer & Porter Co., Hatborough, Pa.; T. C Wheaton Co., Millville, N. J.; Specialty Glass Corp., Newfield, N. J. Among glass makers having equipment suited to the manufacture of glass gage blanks are the following: Libbey Glass Co., Toledo, O.; Sneath Glass Co., Hartford City, Ind.; Duncan & Miller Glass Co., Washington, Pa.; Federal Glass Co., Columbus, O.; Anchor Hocking Glass Corp., Lancaster, O.; Jeanette Shade & Novelty Co., Jeanette, Pa.

The higher frangibility of glass over steel is no detriment to this project as a whole, for this characteristic is more than offset by the greater dimensional stability of this material. In other words, a dropped steel gage may be sprung sufficiently to pass unacceptable work. This could go on undetected for a considerable period of time.

On the other hand, a dropped glass gage either breaks beyond further use or is unaffected. Also this characteristic of high frangibility has a value within itself in that it forces inspectors to respect and handle carefully the gages entrusted to them.

Another favorable characteristic of glass is that while it is subject to scratching, no burrs are raised. This contrasts with the fact that burrs are easily raised by scratches on steel gages, and these burrs may so increase gage dimensions as to render the gage unfit for its job.

The corrosion resistant properties of glass are extremely high and so contrast sharply with the ready rusting of ordinary steel gages which necessitates greasing them for every temporary storage as well as subsequent degreasing

BUNDLES FOR THE AXIS

You've helped make up bundles for Britain, for Russia, for Greece. But here's how you can contribute to bundles for the Axis. Salvage all the scrap metal you can find. Then call in the nearest scrap metal dealer who will be glad to pay you for it and send it to the mills for processing. In this way you will help America and her Allies talk to the Axis with cold, hard steel . . . the only language they seem to understand.

Don't think the scrap metal situation is overemphasized. Here are the figures: 90 million tons of steel in 1943. That's the minimum the mills are asked to produce. To meet this, 45 million tons of scrap metal must be found. Scrap metal dealers, through their regular sources, furnish only 22 million tons.

Where are the other 23 million tons coming from? Every American knows the answer. There must be a continuation of the scrap metal campaign. Every pound of idle scrap must be salvaged and put to work. Go over your factory, your home carefully. Don't overlook anything. It's an individual responsibility.

Contribute your share NOW to "Bundles for the Axis."

THE ANDREWS STEEL CO.
NEWPORT, KENTUCKY
DIVISIONS
THE NEWPORT ROLLING MILL COMPANY
THE GLOBE IRON ROOFING & CORRUGATING CO.

COOPERATION WINS THE WAR

WOLVERINE SALUTES MEMBERS OF A.S.M.

For its worthy contribution to the war effort, the American Society for Metals—the third largest technical society in the world—merits a noble salute.

Born in the first World War, this organization of 16,000 members is today the accepted vehicle for the interchange of vital metallurgical engineering knowledge.

Its importance is well exemplified in a committee engaged to develop the essential, alloy-saving National Emergency steels. Of its twenty-nine metal experts, twenty-eight are A.S.M. members.

H. J. FRENCH
President of American Society for Metals

Throughout the country in the leading industrial centers are other groups, called War Products Advisory Committees, whose function is to consult with manufacturers having metal problems. Valuable counsel is given without charge or obligation to any manufacturer desiring advice.

Engaged as we are in the task of producing copper and copper products, we are naturally conscious of the many problems that are today confronting manufacturers. We can, therefore, well appreciate the value of the assistance that the A.S.M. is rendering to industry, and we consider it an honor to have the opportunity of saluting this society for the constructive work it is doing.

CALUMET AND HECLA CONSOLIDATED COPPER COMPANY
WOLVERINE TUBE DIVISION
Seamless Copper — Brass
1439 CENTRAL AVENUE DETROIT, MICHIGAN

when put back into use. As for wearing qualities, glass seems to be equal to or better than steel.

Glass gages are made in less time and with fewer machine hours. They are lighter and easier to handle and afford a visibility in inspection far beyond that of steel gages. Seizing or galling, particularly noticeable when gaging copper or brass components with a plug gage, is lacking when using glass gages. This factor, together with the lightness factor, has permitted as much as a 50 per cent increase in speed of gaging certain parts.

The engineers of one glass company have designed a complete line of plug and ring blanks to correspond with the American gage design steel blanks as outlined in Commercial Standard, CS 8-41. Their glass blank designs have been contemplated from the standpoint of glass molding technique and the functional use of glass gages. In addition to design work, they have made up for demonstration purposes Lucite models of each type of blank which they have designed. Their work on the design of glass gage blanks represents one of the most constructive moves that has been made to date in the glass development program.

Glass companies will have to do considerable development work to produce a satisfactory blank, and they will also have to educate the steel-gage makers in the method of finish grinding the blanks. To this end they contemplate supplying the blanks with precision centers for final grinding at steel-gage maker's plants. They now have considerable technique in such glass machines that could be readily applied to centering the gage blanks. They also contemplate the rough grinding of blanks because of the diameter variations that are encountered in molding.

TABLE I—Frankford Arsenal, Tentative Specifications, Proposed Draft For

GAGES, GLASS: PLUG, RING, SNAP AND PROFILE

A. APPLICABLE SPECIFICATIONS

A-1. There are no other specifications applicable to this specification.

B. TYPES

B-1. Gages shall be of the following types:
Plug gage—¼" in diameter and over
Plain—go and not go
Double and Plain
Ring gage
Plain—go and no go
Twin Ring
Combination Ring and Snap
Snap gages
Profile and Position gages.

C. MATERIAL AND WORKMANSHIP

C-1. *Material*

C-1a. Gages shall be made from either a lime glass, boro silicate glass, or a light flint glass meeting the reuirements of this specification.

C-1b. If the bidder desires to furnish gages which are made from glass different in composition from that specified, a statement to that effect shall be submitted with his bid fully describing the proposed differences. In addition he shall submit full and sufficient evidence that

"You Can Rely on Roper"

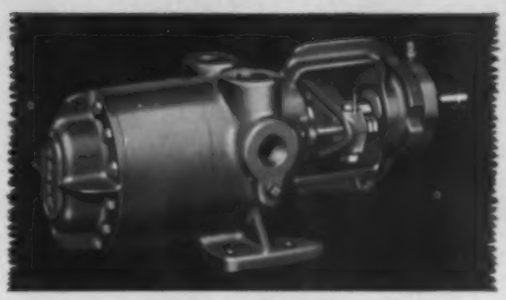
16 Standard Sizes **3** Standard Series **21** Standard Drives and Mountings

THOUSANDS OF COMBINATIONS FROM WHICH YOU CAN SELECT A MODEL THAT IS PRACTICALLY

Custom-Built to fit Your Job!

"PUMP as you never pumped before" is the war time order for every Roper Pump installed in American steel mills and numerous other industries. And Ropers are pumping like sons of guns . . . constantly driving an unfailing flow of oil into the lubricating and hydraulic systems that help to convert metals into munitions and engines of war.

And there are good reasons why Ropers are selected to do the tough war time jobs . . . 85 years of engineering and building experience . . . only two moving parts (the simplest basic design yet conceived) . . . hydraulically balanced . . . easier to install . . . easier to service . . . longer lasting because of minimum wear . . . quick adaptability to any job because of the wide variety of models with nearly every conceivable capacity, pressure, speed, drive, mounting and piping arrangement. . .



Features That Make Good Pumps

ONLY TWO MOVING PARTS—equal size pumping gears.
HYDRAULICALLY BALANCED—gears float in operation.
LARGE BRONZE BEARINGS—two on each side.
SPIRAL PUMPING GEARS—perfectly machined and run-in.
CONSTANT LUBRICATION—(1) by liquid being pumped and (2) by lubricating qualities of the bearing metal used.
WEAR PLATES protect face and back plates from wear by foreign matter.
THRUST COLLAR on drive shaft plus sliding joint takes up shock and thrust.
FOUR PIPE OPENINGS provide eight different piping arrangements.
ROPER PACKED BOX, easily, quickly repacked.
SPLINED DRIVE SHAFT forms sliding joint with gear to absorb shock and thrust.
ALWAYS PRIMED—after once primed and in operation.
ONE PIECE BACKPLATE protects working parts from stress and strain.

HYDRAULICALLY BALANCED

TYPICAL STEEL MILL INSTALLATION

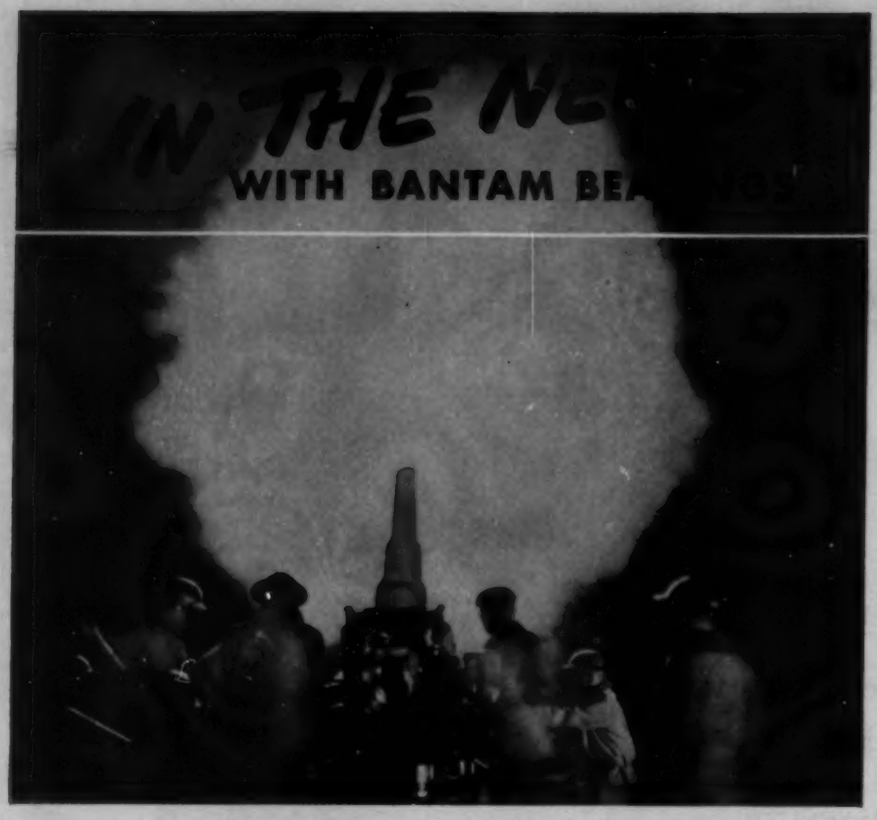
GEO. D. ROPER CORP., ROCKFORD, ILL.
Pittsburgh Office: 207-209 Blvd. Of The Allies

ROPER
Rotary Pumps

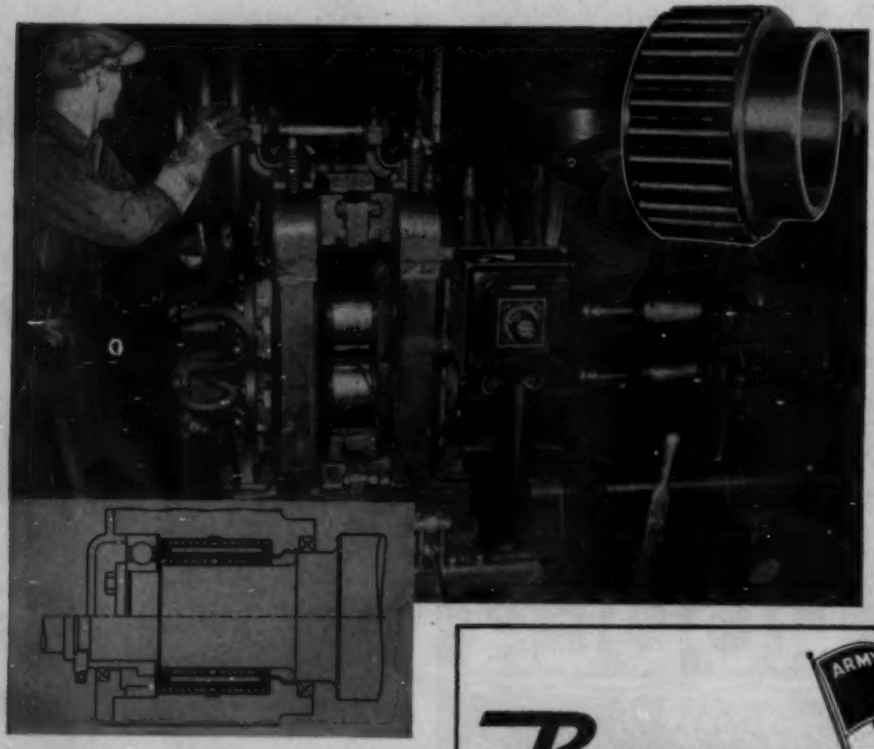
Write For Book No. 948

It contains a summary and a digest of factual information concerning pumps and pumping problems.

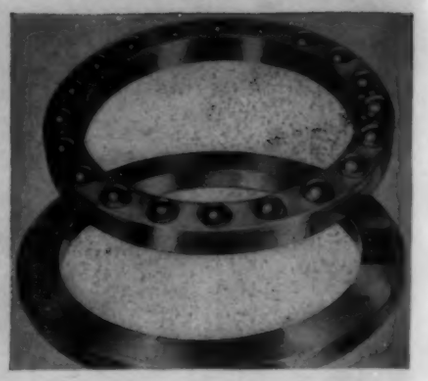
"You Can Rely on Roper"



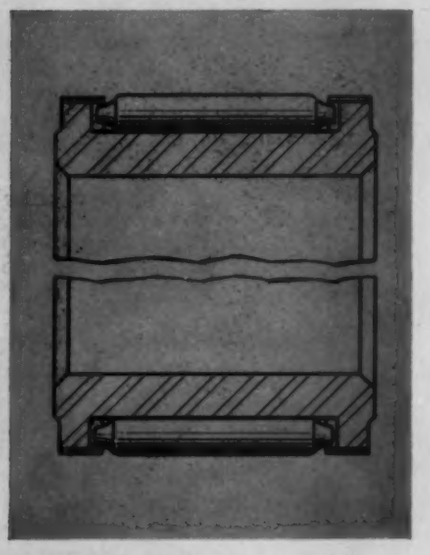
THE TARGET IS MILES ABOVE—yet these 3-inch anti-aircraft guns find their mark with deadly accuracy. The design of America's war equipment—and of the machines to produce it—presents new challenges to industry—and Bantam's skill in the design of special bearings is of great assistance in meeting these new tasks. To serve America's war needs, Bantam has built some of the largest anti-friction bearings ever constructed.



HIGH CAPACITY in a small space is provided by Bantam straight radial roller bearings in this 8-inch flattening mill built by Broden Construction Company, while Bantam Ball Bearings take the thrust load. The bearing arrangement, shown in cross-section view, permits compact design and ease of assembly.



SPLIT-RACE BEARINGS like this one, of the ball thrust type, 19½" I.D., 25" O.D., 3¾" thick, frequently facilitate the assembly of machines. This is typical of the many types of out-of-the-ordinary bearings that Bantam has produced for unusual requirements. Split-race bearings have also been designed and manufactured by Bantam in roller thrust and radial types.



MODIFIED QUILL BEARINGS are adaptable to special applications—retain the familiar advantages of the standard type. In the bearing shown, the rolls are retained to the inner race instead of the outer, as in the standard Quill Bearing. This construction is useful for cases where it is difficult to assemble the parts when the rollers are retained by the outer race.

BANTAM'S ENGINEERING EXPERIENCE covers the design and application of every major type of *standard* anti-friction bearing, as well as of a wide variety of special sizes and types. For advice on the selection of bearings that meet *your* requirements, TURN TO BANTAM.

ARMY E NAVY

BANTAM BEARINGS

STRAIGHT ROLLER · TAPERED ROLLER · NEEDLE · BALL

BANTAM BEARINGS CORPORATION · SOUTH BEND · INDIANA

SUBSIDIARY OF THE TORRINGTON COMPANY · TORRINGTON, CONN.

Helpful Literature

1. Metal Cleaning

Oakite Products, Inc.—40-page illustrated booklet, "Oakite Cleaning Materials & Methods in the Aviation Industry," discusses application of specific cleaning processes and chemical compounds for all types of cleaning operations encountered in aviation plants and in construction of aircraft. Procedures to be employed are outlined.

2. Rotary Pumps

Geo. D. Roper Corp.—8-page illustrated bulletin, "Roper Rotary Pumps," shows design, construction and operation of these gear type pumps. Table gives recommended constructions for all types of liquid service. Selection chart permits specification of proper size to meet given conditions of pressure and capacity. Various types of available drives and mountings are shown.

3. Industrial Trucks

Automatic Transportation Co.—4-page illustrated folder, "Production for Victory," contains brief descriptions of standard models of industrial power trucks which are approved models under WPB General Limitation order L-112 and supplemental order L-112-A. Elevating platform, lift fork, motorized crane and telescopic lift power trucks for all types of materials handling are covered.

4. Cranes & Hoists

Shepard Niles Crane & Hoist Corp.—104-page illustrated manual, "Maintenance & Operation of Shepard Niles Electric Cranes & Hoists," is compiled for maintenance men. Crane nomenclature is explained through labeled illustrations. General information regarding these equipments is outlined and detailed procedures for obtaining maximum service from all types of cranes and hoists are presented.

5. Thermocouples

Arklay S. Richards Co.—12-page illustrated catalog No. 8 contains engineering data regarding thermocouples and their parts, assemblies and accessories for all makes of pyrometers. Suggestions are given on how to obtain maximum service from thermocouples, to assure precise temperature control and to minimize interruption of production.

6. Material Handling

Syntron Co.—48-page illustrated catalog on "Vibratory Material Handling Equipment," is descriptive of electric vibrators for hoppers, bins, chutes, concrete forms and other equipment; vibratory packers and jolters; vibrating feeder conveyors and flow conveyors; batch weighing machines, and electric and hydraulic vibrating equipment. Full details and specifications are given on all machines.

7. Marine Coolers

Ross Heater & Manufacturing Co.—6-page illustrated bulletin, "Designed for Marine Service," is descriptive of type "BCP" lube oil and jacket water coolers. Such features as permanently tight tube joints, high heat transfer rate, compactness, light weight, ease of cleaning and horizontal or vertical mounting are explained. Construction is shown through use of cut-away illustration.

8. Remote Control

Sperry Products, Inc.—4-page illustrated bulletin EHC-78-C explains design, application and operation of the "Exactor" hydraulic control which is being used extensively in marine and aircraft field for exact remote control of throttle, mixture, supercharger, valves, switches. Transmitter delivers exact movement of its handle to lever of receiver without lost motion.

9. V-Belting

Manheim Manufacturing & Belting Co.—8-page illustrated bulletin, "Drive Production Higher," discusses design, application, installation and maintenance of drives using "Veelos" V-belting. Link type construction permits use of this belting with practically any type of equipment. It is easy to couple or uncouple. Engineering tables are included to aid in selection of proper drive.

10. Plate Bending Rolls

Webb Corp.—4-page illustrated bulletin No. 50 is descriptive of pyramid and initial types of plate bending rolls. These machines are available in sizes to accommodate plates ranging from ¼ to ⅝-inch thick and up to 10 feet, 2 inches long. Construction and drive features of machines are shown.

11. Acid Pumps

United States Stoneware Co.—4-page illustrated bulletin No. 702 presents data on line of universal centrifugal acid pumps for handling hot or cold corrosive solutions. Direct connected, these pumps have corrosion-resistant chemical stoneware linings and impellers for specific services. Capacities range from 30 to 600 gallons per minute with special impeller and 30 to 475 gallons per minute with standard impeller.

12. Hydraulic Controls

Vickers, Inc.—16-page illustrated bulletin No. 41-10 is entitled "Vickers Traverse and Feed Cycle Control Panels." Design, operation and features of these cycle control panels which may be applied to drilling, reaming, boring, turning, milling and swaging machinery are explained. This unit provides any cycle sequence of rapid advance, adjustable coarse feed, fine feed and rapid return motions.

13. Industrial Sweepers

Moto-Mower Co.—4 and 6-page illustrated catalogs on "Moto-Sweepers" are descriptive of three models of these sweepers for industrial plants. "Commander" and "Fleetway" models are motorized and have optional sulky equipment for use in large plants. "Detroit" model is manually operated and is claimed to permit cleaning of up to 16,000 square feet of floor area per day.

14. Field Rheostats

Ward Leonard Electric Co.—16-page illustrated bulletin No. 60-A contains general information regarding design, application and available capacities of "Vitrohm" and "Ribohm" field rheostats which are available in several multiples of field resistance values to meet various operating conditions. Both manual and motor drive models are described, and full line of accessory equipment is covered.

15. Milling Machine

Sommer & Adams Co.—4-page illustrated bulletin, "Production," giver complete description and specifications on "Cleveland" No. 1½ horizontal milling machine which is claimed to set up easily for long or short runs. Features include automatic spindle brake, automatic table cycle, wide range of feeds and speeds, rapid return and approach, anti-friction bearings and heavy duty construction.

16. Motorized Reducer

Link-Belt Co.—18-page illustrated catalog No. 1515 and price list is descriptive of "Link-Belt" motorized speed reducer which is combination of standard electric motor and helical gear speed reducing unit. Models are available in wide range of speed reductions and transmitted horsepowers. Service factors, selection tables, dimensions, installation and applications of these units are covered.

17. Wire Rope & Cable

John A. Roebling's Sons Co.—Two illustrated tags A and C present practical guidance and suggestions on installation and care of wire rope and cable. These tags are entitled, "How to Make Wire Rope Last" and "How to Make Elevator Cable Last Longer."

18. Electrical Maintenance

Anaconda Wire & Cable Co.—44-page illustrated publication No. C-53 is entitled, "Preventative Maintenance Wiring System Survey." It presents a practical plan to prevent electrical shutdowns that could interrupt wartime production. Included are sample survey record forms, employe instruction cards and plant posters for use by those concerned with maintenance of industrial plant electrical systems.

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19. Tubing Fittings

Weatherhead Co.—17 x 22-inch wall chart illustrates aviation fittings, hydraulic hose valves and other aviation accessories. Chart is intended as convenient guide for selection of tube, pipe, universal and hose fittings which meet Air Corps, Navy and "AN" specifications. It is available to engineering, production, design and purchasing executives.

20. Metal Cleaning

Turco Products, Inc.—20-page instruction bulletin on, "Cleaning Metals Before Processing," explains procedures recommended for precleaning prior to anodizing, chromatizing and phosphatizing. Instructions and suggestions are given on auxiliary cleaning tank layout. Specific products for use in metal cleaning before processing are described.

21. Condensation Drip Preventive

J. W. Mortell Co.—32-page illustrated handbook tells how to prevent and cure damaging condensation and sweat that forms on metal pipes, fixtures, basement walls and ceilings by application of "NoDrip" plastic cork coating. Instructions as to application, coverage and drying time are given.

22. Industrial Trucks

Mercury Manufacturing Co.—20-page illustrated bulletin No. 230 covers "Mercury" trucks, tractors and trailers conforming to provisions of War Production Board Limitation order L-118. Steps of procedure to obtain one of these approved models are outlined. Drawings and specifications for various models are included.

23. Steel Spring Washers

National Lock Washer Co.—12-page illustrated bulletin describes "Kantlink" spring washers. Spring expanding component maintains tightness of bolted parts as they wear in use. Non-linking design prevents tangling. Selection chart lists recommended spring washer sizes for use with American standards of bolts, nuts and screws.

24. Thermit Welding

Metal & Thermit Corp.—80-page illustrated booklet No. 18d discusses thermit welding. History of science of alumino-thermics is traced and procedure of welding is explained. Separate chapters cover use of this type welding in fabrication of heavy parts, miscellaneous repairs, welding in steel mills, rail welding, marine repairs, new construction and foundry applications. Types of carbide-free alloys which are produced by means of aluminum reduction are listed.

25. Flexible Metal Hose

Pennsylvania Flexible Metallic Tubing Co.—67-page illustrated "Pennflex" metal hose catalog is compilation of 12 bulletins covering flexible piping and couplings for transport of air, oil, steam, gases and volatiles. Supplementary sheet contains information on prices, freight allowances, terms of payment, contracts, credit, taxes and minimum charges.

26. Steel Analysis

American Steel & Wire Co.—Standard steel analysis chart includes all modifications and changes in analyses of AISI, SAE and new NE steels up to February 1. Chart covers carbon and free cutting steels, manganese, nickel, nickel chromium and molybdenum steels, in addition to chromium, chromium vanadium, silicon manganese and National Emergency steels.

27. Induction Heating

Van Norman Machine Tool Co.—8-page illustrated bulletin, "Induction Heating Units", covers principles of operation of induction heating unit. Units are available in two sizes—16 and 32 kilowatts. Heating unit may be used for heat treating, brazing, soldering, annealing, forging and melting. Triple cluster gears, rack teeth, differential hardening, and feed drive shaft may be surface hardened with induction heating.

28. Material Conservation

Westinghouse Electric & Manufacturing Co.—96-page illustrated booklet, "Wartime Conservation" contains recommendations for effecting immediate savings of critical materials in selection, application and use of "Westinghouse" equipment and at same time getting more production from present equipment. Booklet points out that at present time Axis has more critical materials than we do and warns we must turn balance in our favor.

29. Nitriding Furnaces

Nitralloy Corp.—99-page illustrated booklet, "Nitriding Furnaces", is practical exposition on constructional features, capacities, operation and instrumentation of nitriding furnaces with notes on ammonia and its handling. This four chapter booklet is subdivided into thirty-six sections dealing with specific aspects of subject. Drawing, charts and photographs amplify text.

30. Electrical Distribution

BullDog Electric Products Co.—76-page illustrated bulletin No. 427 explains enclosed busbar method of electrical distribution for industrial plants and commercial buildings. Types covered are "LO-X" low reactance bus duct for feeder circuits of 1000 to 3000 amperes, and plug-in type bus duct for branch circuits of 250 to 1500 amperes. Dimensional data, construction details and specifications are given.

31. Hand Screw Machine

Oster Manufacturing Co.—12-page illustrated catalog list No. 37-B is descriptive of improved No. 60 "Rapiduction" screw machine. Machine is equipped with automatically indexed, six-station turret or plain saddle with single toolpost. Both worm and direct drives can be provided, depending on spindle speed range desired. Individual parts of machine are illustrated and specifications are given.

32. Draw Benches

Standard Machinery Co.—8-page illustrated bulletin section DB describes line of draw benches comprising eight sizes and two general types for operation by one man. Such special attachments as Turks heads, plug anchor, sloshing tank, draw-rod pusher and work delivery device are also covered. Specifications are given on these machines.

33. Electric Motors

Ohio Electric Manufacturing Co.—10-page illustrated bulletin No. 210 is concerned with "Ohio" fractional horsepower electric motors made in all standard sizes from 1/20 to 1/3 horsepower, in speeds from 860 to 3500 revolutions per minute, for 115 and 230 volts and usual frequencies. Motors are designed and built to specific requirements.

34. Vertical Turret Mills

Rogers Machine Works, Inc.—12-page illustrated bulletin No. 481 describes "Rogers Perfect 36" vertical turret mills which provide tool settings for boring, drilling, reaming, turning and thread cutting. Mills are available in standard speed and high speed models. Specifications and operation charts are included.

35. Revolving Tables

Ohio Machine Tool Co.—12-page illustrated bulletin No. 375 describes "Ohio" revolving tables of both round and square types. Units can be arranged to suit many types of machine tools in addition to horizontal boring, drilling and milling machines for which they are primarily intended. Any number of positive index positions can be furnished.

36. Seamless Alloy Tubes

Tubular Alloy Steel Corp.—4-page illustrated folder describes seamless alloy tubes which are available in current range of alloys. Tubes are especially developed for aircraft tubing, bearing stock, still tubes, condenser and heat exchanger tubes and various mechanical purposes requiring specially processed material. Diameters range from ¼-inch to 8¾ inches in customary wall thicknesses.

37. Nitriding Furnaces

Leeds & Northrup Co.—20-page illustrated catalog No. T-624 describes "Homo" method for nitriding. Method is said to give heat-treaters precise control of three important variables, nitriding temperature, flow and distribution of ammonia gas and duration of treatment. Heater consists of nickel-chrome wire, mounted on sturdy heat-resistant alloy frame. These nitriding furnaces are supplied to operate on 220-volt, 60-cycle, 1, 2 or 3-phase electrical circuits.

38. Gear Shaping

Michigan Tool Co.—12-page illustrated bulletin No. GS-42 concerns gear shaping and shaper cutters. Proper procedure for manufacture of accurate gears by involute generating process is outlined. Gear shaping is compared to hobbing process of producing gears. Various types of gear finishers, gear lappers, gear checkers and other equipment produced by company for manufacture of gears are listed.

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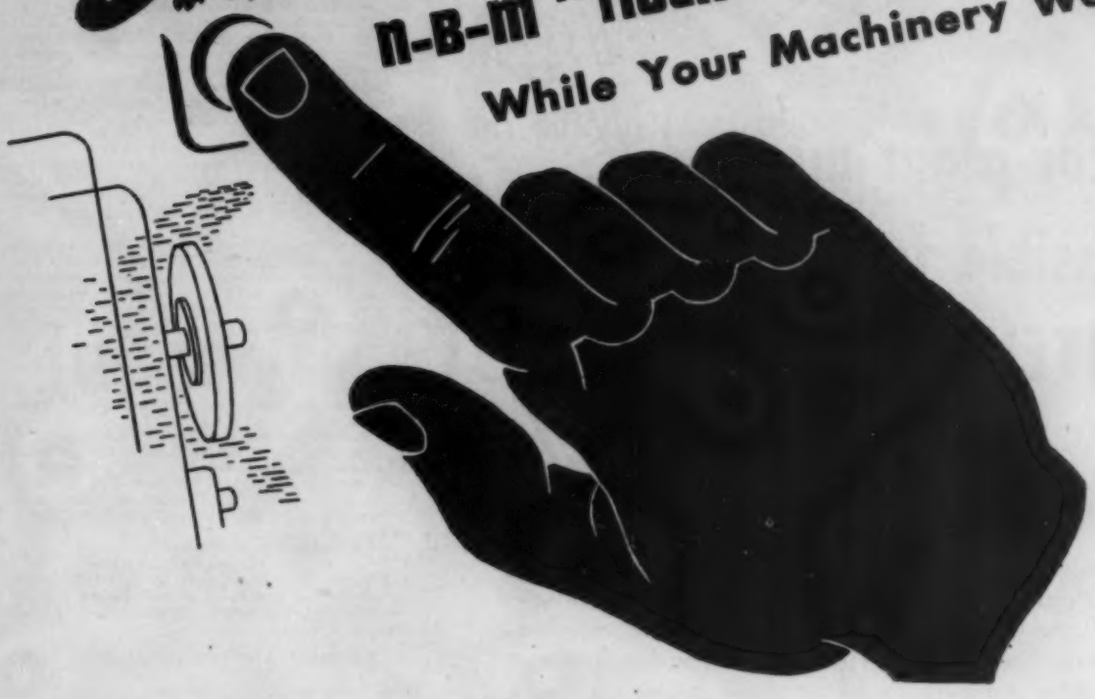
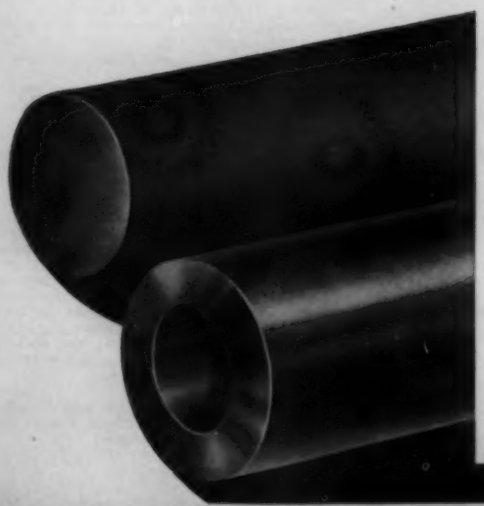


When a machine starts, lubrication does not reach the bearings instantly. In this brief moment, the quality of the bearing decides the life of your machine.



Bearings made of "Tiger" Bronze contain lead, evenly distributed. When metal runs on metal, the soft lead functions as a lubricant.

Write for our "Tiger" Bronze Chart — showing the hundreds of sizes of cored and solid bars available — rough and machined.

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such proposed gages are equal in all respects to the gages covered by this specification.

C-2. *Workmanship.* Gages shall be free from seams, cracks, scratches, and other injurious defects deqtrimental to the use or life of the gage.

D. GENERAL REQUIREMENTS

D-1. *Dimensions and Tolerances.*

D-1a. The dimensions and tolerances of gages shall be as specified in applicable drawings when measured at the standard temperature of 68°F (20°C).

D-1b. Unless otherwise specified, all exposed edges shall be beveled or finished to a radius to eliminate sharp corners.

D-2. *Color.* Gages shall be colorless unless otherwise specified on applicable drawings.

D-3. *Marking of gages.*

D-3a. Each gage shall be plainly and permanently marked for identification in accordance with applicable drawings.

D-3b. Gages shall be marked by a suitable etching process, or any other approved process not using an inscribing device.

E. DETAIL REQUIREMENTS

E-1. Coefficient of thermal expansion of the glass shall not be greater than 0.0000060 inch per inch per degree F, preferably from 0.0000040 inch to 0.0000060 inch per inch per degree F.

E-2. *Strain.* The distribution of permanent strain in each gage shall by symmetrical. The birefringence resulting from the permanent strains shall not produce a relative retardation or path difference of over 10 millimicrons per centimeter of transmitted light path for sodium light.

F. METHODS OF INSPECTION AND TESTS

F-1. Each gage shall be inspected visually for compliance with the requirements of paragraph C-2.

F-2. *Dimensional inspection.* Each gage shall be measured for compliance with the specified dimensions and tolerances. The accuracy of each measurement shall be controlled by comparison with dimensional standards which have been certified by the National Bureau of Standards.

F-3. *Coefficient of thermal expansion.*
(To be specified later)

F-4. *Strain.* Each gage shall be inspected for strain by means of a polariscope supplemented by calibrated specimen of known amount of strain.

G. PACKING AND MARKING FOR SHIPMENT

G-1. *Packing*

G-1a. Gages shall be so packed as to protect against damage by contact with other gages during transit. Heavy gages shall be rigidly fastened in place so that no movement is possible in the package.

C-1b. Unless otherwise specified, gages shall be packed in standard commercial containers so constructed as to insure acceptance by common or other carrier for safe transportation, at the lowest rate, to the point of delivery.

G-2. *Marking.* Unless otherwise specified, shipping containers shall be marked with the name, size and quantity of gages contained therein, as defined by the contract or purchase order under which shipment is made, the name of the contractor and the number of the contract or purchase order.

NOTICE: When Government drawings, specifications or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be relatcd thereto.

NOTE: Copies of this specification may be obtained from the Commanding Officer Frankford Arsenal, Philadelphia, Pennsylvania.

Editor's Note:

Due to lack of space in this issue, Table II, which should have appeared with the story "Facts and Figures on the Use of NE Alloy Steels", appearing on page 78, was purposely left out. To provide readers with all information possible on these steels, however, this table will be included in next week's issue.

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An aluminum silicon iron alloy that facilitates control and uniformity in fine-grained steels

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Greater uniformity from heat to heat simplifies melting problems

Improve Your Products

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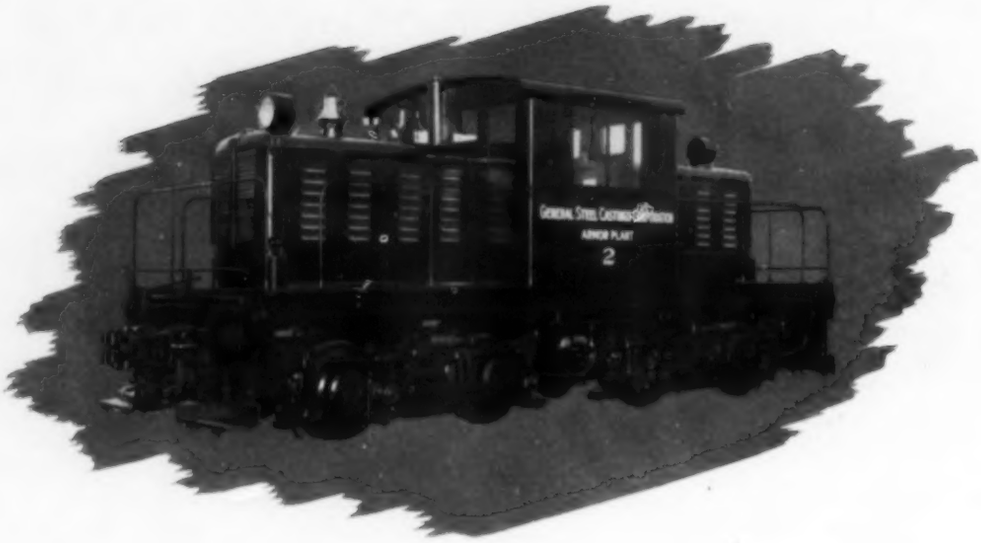
We will be pleased to discuss your melting problems and requirements

WHITCOMB LOCOMOTIVES



Steady Performance
With The Barest Attention To Maintenance

The rugged, compact power unit illustrated above reminds us of a sea turtle: once they are hatched, they are on their own, and can look forward to a long life. WHITCOMB LOCOMOTIVES are inexpensively produced, and are acclaimed by users as the practical solution to demands for better service, for dependable service, for cheaper service. In mills and industrial plants all over the country WHITCOMB mobile power units are doing more than their share in speeding production, trimming costs, improving switching and haulage service. Punishment, abuse, long hours of continuous service have no apparent adverse effect on the efficacy of the WHITCOMB. If you are interested in obtaining the best investigate the merits of WHITCOMBS.

DIESEL or GASOLINE POWER, MECHANICAL, HYDRAULIC, or ELECTRIC DRIVE

BLW
THE BALDWIN GROUP

THE WHITCOMB LOCOMOTIVE CO.

ROCHELLE, ILL.

Subsidiary of THE BALDWIN LOCOMOTIVE WORKS

Easier Situation in Steel Indicated for This Year

Restrictions on civilian durable goods may be eased. . . War production ahead of schedule. . . Ore season delayed by ice. . . CMP assuming control of steel distribution

DEMAND
Heavy under CMP provisions.

PRODUCTION
Down ½-point to 99 per cent.

PRICES
Holding at ceilings.

RECENT indications from Washington that production limitations may be eased on certain durable consumer goods are in line with observation of some steel industry leaders that steel production this year may be much larger.

Ingot production during the current quarter is estimated at an annual rate of about 89,000,000 tons, compared with about 86,000,000 tons last year. With additional capacity scheduled for completion this year some believe the output may reach 92,000,000 tons. More conservative observers believe this estimate too high, on the ground that steelmaking equipment has been pushed so hard it will require much repair this year. Most opinion is that at least 4,000,000 tons additional will be available.

Restrictions on building and some other outlets, including exports, may add a substantial tonnage to this, making considerable steel available for less essential requirements. Recent statements by military officers are to the effect that production is ahead of schedule in certain types of ordnance, guns, shells and tanks. It appears likely that any easing in non-war restrictions will not come until last half and the belief is held it may appear first in releases of frozen items now in control of the Steel Recovery Corp.

• • •

Carbon bar sellers in general are well booked into May on CMP orders, which take precedence over PRP ratings. Percentage of the former is increasing rapidly, hastened by the effort to have old orders certified under the new plan. Mill order departments have difficulty keeping pace with this development. Cold-drawn bar sellers are booked further than hot-rolled producers, with little available before June. Alloy cold-drawn bar deliveries are about 30 days further delayed. Large bars of all descriptions are tight and most tonnage is moving on directives.

Steelworks operations last week declined ½-point to 99 per cent, mainly due to interruption by flood in the Cincinnati district and closing of a mill in eastern Pennsylvania by labor trouble. The Cincinnati rate dropped 8 points to 80 per cent, eastern Pennsylvania was down 2 points to 93 per cent and Cleveland lost 3 points to 92 per cent. Chicago advanced ½-point to 99 per cent, New England 3 points to 95, Detroit 2 points to 94 and St. Louis 2 points to 93. Pittsburgh held steady at 101 per cent, Wheeling at 88½, Buffalo at 90½, Birmingham at 100 and Youngstown at 98 per cent.

While scrap supply supports steelmaking at the continuing high rate some uneasiness is expressed over the fact that mill reserves are less than what is considered a safe margin and current receipts in some areas are below consumption. Continued use from stocks is reducing the margin of safety. A factor in the situation is continued lack of manpower for yard preparation. Some observers fear a repetition of last summer's shortage. In the Chicago district, according to War Production Board, only three of the 22 steelmaking plants have 30 days supply in stock.

Award of 22,500 tons of 20-inch pipe for a natural gas line from Maumee, O., to a point near Cleveland, to carry natural gas originating in Texas, is the largest similar contract since the eastern portion of the "Big Inch" oil line was let a few months ago.

• • •

Blast furnaces in the United States and Canada consumed 7,103,914 gross tons of Lake Superior iron ore in February, compared with 6,403,362 tons in February, 1942. For two months total consumption was 14,869,088 tons, against 13,561,785 tons in the corresponding period last year. Active blast furnaces March 1 numbered 177 in the United States and nine in Canada. A year earlier the figures were 171 and seven. Ore stocks at furnaces and on Lake Erie docks March 1 totaled 32,743,294 tons; a year ago they were 27,525,822 tons.

Opening of navigation on the Great Lakes is delayed by heavy ice in harbors and rivers. A year ago cargoes were already moving from the head of the lakes. Ice breakers are about to start opening channels but several days must elapse at best before ships can move into Lake Superior.

With OPA holding ceilings firm on all steel and iron products composite averages are unchanged. Finished steel composite continues at $56.73, semifinished steel at $36, steelmaking pig iron at $23.05 and steelmaking scrap at $19.17.

COMPOSITE MARKET AVERAGES

	Mar. 27	Mar. 20	Mar. 13	One Month Ago Feb., 1943	Three Months Ago Dec., 1942	One Year Ago Mar., 1942	Five Years Ago Mar., 1938
Finished Steel	$56.73	$56.73	$56.73	$56.73	$56.73	$56.73	$62.00
Semifinished Steel	36.00	36.00	36.00	36.00	36.00	36.00	40.00
Steelmaking Pig Iron	23.05	23.05	23.05	23.05	23.05	23.05	22.92
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	19.17	13.40

Finished Steel Composite:—Average of industry-wide prices on sheets, strip, bars, plates, shapes, wire, nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material

	March 27, 1943	Feb., 1943	Dec., 1942	Mar., 1942
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.49	2.49	2.49	2.47
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.22	2.22	2.22	2.22
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.10	2.10	2.10	2.10
Plates, Philadelphia	2.15	2.15	2.15	2.15
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.50	3.50	3.50	3.50
Bright bess., basic wire, Pittsburgh	2.60	2.60	2.60	2.60
Tin plate, per base box, Pittsburgh	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.55	2.55	2.55	2.55

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods No. 5 to $\frac{5}{16}$-inch, Pittsburgh	2.00	2.00	2.00	2.00

Pig Iron

	March 27, 1943	Feb., 1943	Dec., 1942	Mar., 1942
Bessemer, del. Pittsburgh	$25.19	$25.19	$25.19	$25.19
Basic, Valley	23.50	23.50	23.50	23.50
Basic, eastern, del. Philadelphia	25.39	25.39	25.39	25.365
No. 2 fdry., del. Pgh., N.&S. Sides	24.69	24.69	24.69	24.69
No. 2 foundry, Chicago	24.00	24.00	24.00	24.00
Southern No. 2, Birmingham	20.38	20.38	20.38	20.38
Southern No. 2, del. Cincinnati	24.30	24.30	24.30	24.06
No. 2X, del. Phila. (differ. av.)	26.265	26.265	26.265	26.24
Malleable, Valley	24.00	24.00	24.00	24.00
Malleable, Chicago	24.00	24.00	24.00	24.00
Lake Sup., charcoal, del. Chicago	31.54	31.54	31.54	31.54
Gray forge, del. Pittsburgh	24.19	24.19	24.19	24.19
Ferromanganese, del. Pittsburgh	140.65	140.65	140.65	125.39

Scrap

Heavy melting steel, Pitts.	$20.00	$20.00	$20.00	$20.00
Heavy melt. steel, No. 2, E. Pa.	18.75	18.75	18.75	18.75
Heavy melting steel, Chicago	18.75	18.75	18.75	18.75
Rails for rolling, Chicago	22.25	22.25	22.25	22.25
No. 1 cast, Chicago	20.00	20.00	20.00	20.00

Coke

Connellsville, furnace, ovens	$6.50	$6.15	$6.00	$6.00
Connellsville, foundry, ovens	7.25	7.25	7.25	7.25
Chicago, by-product fdry., del.	12.25	12.25	12.25	12.25

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941 and Feb. 4, 1942. The schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold-rolled iron or steel products and any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding, etc., although only principal established basing points for selected products are named specifically. All seconds and off-grade products also are covered. Exceptions applying to individual companies are noted in the table. Federal tax on freight charges, effective Dec. 1, 1942, not included in following prices.

Semifinished Steel

Gross ton basis except wire rods, skelp.

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00.
(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel ingots at $33 gross ton, f.o.b. mill.)

Alloy Steel Ingots: Pittsburgh, uncropped, $45.00.

Rerolling Billets, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $34.00; Detroit, del. $36.25; Duluth (bil.) $36.00.
(Andrews Steel Co., carbon slabs $41; Continental Steel Corp., billets $34, Kokomo, to Acme Steel Co.; Northwestern Steel & Wire Co. $41, Sterling, Ill.; Laclede Steel Co. $34, Alton or Madison, Ill.; Wheeling Steel Corp. $36 base, billets for lend-lease, $34, Portsmouth, O., on slabs on WPB directives.)

Forging Quality Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $40.00; Detroit, del. $42.25; Duluth, $42.00.
(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points.)

Open Hearth Shell Steel: Pittsburgh, Chicago, base 1000 tons one size and section: 3-12 in., $52.00; 12-18 in., $54.00; 18 in. and over, $56.00.

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54.00.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $34. (Wheeling Steel Corp. $37 on lend-lease sheet bars, $38 Portsmouth, O., on WPB directives; Empire Sheet & Tin Plate Co., Mansfield, O., carbon sheet bars, $39, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Pt., Youngstown, Coatesville, lb., $1.90.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, No. 5—9/32 in., inclusive, per 100 lbs., $2.00.
Do., over 9/32—47/64-in., incl., $2.15. Worcester add $0.10 Galveston, $0.27. Pacific Coast $0.50 on water shipment.

Bars

Hot-Rolled Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, base 20 tons one size, 2.15c; Duluth, base 2.25c; Detroit, del. 2.27c; New York del. 2.51c; Phila. del. 2.49c; Gulf Ports, dock 2.52c, all-rail 2.59c; Pac. ports, dock 2.50c; all rail 3.25c.
(Phoenix Iron Co., Phoenixville, Pa., may quote 2.35c at established basing points.)
Joslyn Mfg. Co. may quote 2.35c, Chicago base. Calumet Steel Division, Borg Warner Corp., may quote 2.35c, Chicago base, on bars produced in its 8-inch mill.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill.)

Hot-Rolled Alloy Bars: Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.70c; Detroit, del., 2.82c.
(Texas Steel Co. may use Chicago base price as maximum f.o.b. Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

AISI Series	(*Basic O-H)	AISI Series	(*Basic O-H)
1300	$0.10	4100 (.15-.25 Mo)	0.55
		(.20-.30 Mo)	0.60
2300	1.70	4340	1.70
2500	2.55	4600	1.20
3000	0.50	4800	2.15
3100	0.70	5100	0.35
3200	1.35	5130 or 5152	0.45
3400	3.20	6120 or 6152	0.95
4000	0.45-0.55	6145 or 6150	1.20

*Add 0.25 for acid open-hearth; 0.50 electric.

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.65c; Detroit 2.70.

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.35c; Detroit, del. 3.47c.

Turned, Ground Shafting: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base (not including turning, grinding, polishing extras) 2.65c; Detroit 2.72c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base 2.15c; Detroit del. 2.27c; Gulf ports, dock 2.52c, all-rail 2.61c; Pacific ports, dock 2.80c, all-rail 3.27c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, base 2.15c; Detroit, del. 2.27c; Gulf ports, dock 2.52c, all-rail 2.61c; Pacific ports, dock 2.80c, all-rail 3.25c.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel reinforcing bars 2.33c, f.o.b. mill.)

Iron Bars: Single refined, Pitts. 4.40c, double refined 5.40c; Pittsburgh, staybolt, 5.75c; Terre Haute, common, 2.15c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base 2.10c; Granite City, base 2.20c; Detroit del. 2.22c; Phila. del. 2.28c; New York del., 2.35c; Pacific ports 2.65c.
(Andrews Steel Co. may quote hot-rolled sheets for shipment to Detroit and the Detroit area on the Middletown, O. base.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.05c; Granite City, base 3.15c; Detroit del. 3.17c; New York del. 3.41c; Phila. del. 3.39c; Pacific ports 3.70c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.50c; Granite City, base 3.60c; New York del. 3.74c; Phila. del. 3.68c; Pacific ports 4.05c.
(Andrews Steel Co. may quote galvanized sheets 3.75c at established basing points.)

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29 gage, per square 3.31c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16 gage, not corrugated, copper alloy 3.60c; copper iron 3.90c, pure iron 3.95c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh 4.25c.

Enameling Sheets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 10 gage.

base 2.75c; Granite City, base 2.85c; Pacific ports 3.40c.

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 20 gage, base 3.35c; Granite City, base 3.45c; Pacific ports 4.00c.

Electrical Sheets, No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.20c	3.95c	3.30c
Armature	3.55c	4.30c	3.65c
Electrical	4.05c	4.80c	4.15c
Motor	4.95c	5.70c	5.05c
Dynamo	5.65c	6.40c	5.75c
Transformer			
72	6.15c	6.90c	.....
65	7.15c	7.90c	.....
58	7.65c	8.40c	.....
52	8.45c	9.20c	.....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base, 1 ton and over, 12 inches wide and less 2.10c; Detroit del. 2.22c; Pacific ports 2.75c. (Joslyn Mfg. Co. may quote 2.30c, Chicago base.)

Cold Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.92c; Worcester base 3.00c.

Commodity C. R. Strip: Pittsburgh, Cleveland, Youngstown, base 3 tons and over, 2.95c; Worcester base 3.35c.

Cold-Finished Spring Steel: Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 Carb., 2.80c; .51-.75 Carb., 4.30c; .76-1.00 Carb., 6.15c; over 1.00 Carb., 8.35c.

Tin, Terne Plate

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb. base box, $5.00; Granite City $5.10.

Electrolytic Tin Plate: Pittsburgh, Gary, 100-lb. base box $4.50.

Tin Mill Black Plate: Pittsburgh, Chicago, Gary, base 29 gage and lighter, 3.05c; Granite City, 3.15c; Pacific ports, boxed 4.05c.

Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c.

Manufacturing Ternes: (Special Coated) Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City $4.40.

Roofing Ternes: Pittsburgh base per package 112 sheets; 20 x 28 in., coating I.C., 8-lb. $12.00; 15-lb. $14.00; 20-lb. $15.00; 25-lb. $16.00; 30-lb. $17.25; 40-lb. $19.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.10c; New York, del., 2.30-2.55c; Phila., del., 2.15c; St. Louis, 2.34c; Boston, del., 2.42-67c; Pacific ports, 2.65c; Gulf Ports, 2.47c. (Granite City Steel Co. may quote carbon plates 2.35c, f.o.b. mill. Central Iron & Steel Co. 2.20c, f.o.b. basing points.)

Floor Plates: Pittsburgh, Chicago, 3.35c; Gulf ports, 3.72c; Pacific ports, 4.00c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c.

Wrought Iron Plates: Pittsburgh, 3.80c.

Shapes

Structural shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del., 2.28c; Phila., del., 2.22c; Gulf ports, 2.47c; Pacific ports, 2.75c. (Phoenix Iron Co., Phoenixville, Pa. may quote carbon steel shapes at 2.30c at established basing points and 2.50c, Pheonixville, for export.)

Steel Sheet Piling: Pittsburgh, Chicago, Buffalo, 2.40c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham (except spring wire) to manufacturers in carloads (add $2 for Worcester):

Bright basic, bessemer wire	2.60c
Galvanized wire	2.60c
Spring wire	3.20c

Wire Products to the Trade:

Standard and cement-coated wire nails, polished and staples, 100-lb. keg	$2.55
Annealed fence wire, 100 lb.	3.05
Galvanized fence wire, 100 lb.	3.40
Woven fence, 12½ gage and lighter, per base column	.67
Do., 11 gage and heavier	.70
Barbed wire, 80-rod spool, col.	.70
Twisted barbless wire, col.	.70
Single loop bale ties, col.	.59
Fence posts, carloads, col.	.69
Cut nails, Pittsburgh, carloads	$3.85

Pipe, Tubes

Welded Pipe: Base price in carloads to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

	Butt Weld Steel Blk.	Butt Weld Steel Galv.		Butt Weld Iron Blk.	Butt Weld Iron Galv.
⅛	56	33	½	24	3½
¼ & ⅜	59	40½	¾	30	10
½	63½	51	1-1¼	34	16
⅝	66½	55	1½	38	18½
1-3	68½	57½	2	37½	18

	Lap Weld Steel Blk.	Lap Weld Steel Galv.		Lap Weld Iron Blk.	Lap Weld Iron Galv.
2	61	49½	1¼	23	3½
2½-3	64	52½	1½	28½	10
3½-6	66	54½	2	30½	12
7-8	65	52½	2½, 3½	31½	14½
9-10	64½	52	4	33½	18
11-12	63½	51	4½-8	32½	17
			9-12	28½	12

Boiler Tubes: Net base prices per 100 feet, f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O. D. Sizes	B.W.G.	—Seamless— Hot Rolled	Cold Drawn	—Lap Weld— Steel	Charcoal Iron
1"	13	$ 7.82	$ 9.01	.....	.....
1¼"	13	9.26	10.67	.....	.....
1½"	13	10.23	11.72	$ 9.72	$23.71
1¾"	13	11.64	13.42	11.06	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2¼"	12	16.01	18.45	15.16	.....
2½"	12	17.54	20.21	16.58	26.57
2¾"	12	18.59	21.42	17.54	29.00
3"	12	19.50	22.48	18.35	31.38
3½"	11	24.63	28.37	23.15	39.81
4"	10	30.54	35.20	28.66	49.90
4½"	10	37.35	43.04	35.22	.....
5"	9	46.87	54.01	44.25	73.93
6"	7	71.96	82.93	68.14	.....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $40.00.

Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $40.00.

*Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $28-$30.

Supplies: Angle bars, 2.70c; tie plates, 2.15c; track spikes, 3.00c; track bolts, 4.75c; do. heat treated, 5.00c.

*Fixed by OPA Schedule No. 46, Dec. 15, 1941.

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, base, cents per lb.: Reg. carbon 14.00c; extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.

High Speed Tool Steels:

Tung.	Chr.	Van.	Moly.	Pitts. base, per lb.
18.00	4	1	-	67.00c
1.5	4	1	8.5	54.00c
	4	2	8	54.00c
5.50	4	1.50	4	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

CHROMIUM NICKEL STEEL

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
311	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	.....	.....
*316	40.00	44.00	48.00	40.00	48.00
*317	50.00	54.00	58.00	50.00	58.00
†321	29.00	34.00	41.00	29.25	38.00
‡347	33.00	38.00	45.00	33.00	42.00
431	19.00	22.00	29.00	17.50	22.50

STRAIGHT CHROMIUM STEEL

403	21.50	24.50	29.50	21.25	27.00
**410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
††420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
‡‡430F	19.50	22.50	29.50	18.75	24.50
442	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	32.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00

STAINLESS CLAD STEEL (20%)

304	.....	§§18.00	19.00	.....	.....

*With 2-3% moly. †With titanium. ‡With columbium. **Plus machining agent. ††High carbon. ‡‡Free machining. §§Includes annealing and pickling.

Basing Point Prices are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the same designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.

Extras mean additions or deductions from base prices in effect April 16, 1941.

Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific Coast points are deemed basing points except in the case of the latter two areas when water transportation is not available, in which case nearest basing point price, plus all-rail freight may be charged.

Domestic Ceiling prices are the aggregate of (1) governing basing point price, (2) extras and (3) transportation charges to the point of delivery as customarily computed. **Governing basing point** is basing point nearest the consumer providing the lowest delivered price. **Emergency basing point** is the basing point at or near the place of production or origin.

Seconds, maximum prices: flat-rolled rejects 75% of prime prices; wasters 75%, waste-wasters 65%, except plates, which take waster prices; tin plate $2.80 per 100 lbs.; terne plate $2.25; semifinished 85% of primes; other grades limited to new material ceilings.

Export ceiling prices may be either the aggregate of (1) governing basing point or emergency basing point (2) export extras (3) export transportation charges provided they are the f.a.s. seaboard quotations of the U. S. Steel Export Co. on April 16, 1941.

Bolts, Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%.

Carriage and Machine

½ x 6 and smaller	65½ off
Do., ⅞ and ⅝ x 6-in. and shorter	63½ off
Do., ⅝ to 1 x 6-in. and shorter	61 off
1⅛ and larger, all lengths	59 off
All diameters, over 6-in. long	59 off
Tire bolts	50 off
Step bolts	56 off
Plow bolts	65 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Nuts

	U.S.S.	S.A.E.
Semifinished hex.		
⅞-inch and less	62	64
½-1-inch	59	60
1⅛-1½-inch	57	58
1⅝ and larger	56	..

Hexagon Cap Screws

Upset 1-in., smaller	64 off
Milled 1-in., smaller	60 off

Square Head Set Screws

Upset, 1-in., smaller	71 off
Headless, ¼-in., larger	60 off
No. 10, smaller	70 off

Piling

Pittsburgh, Chicago, Buffalo	2.40c

Rivets, Washers

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham

Structural	3.75c
⅞-inch and under	65-5 off
Wrought washers, Pittsburgh, Chicago, Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l.	$2.75-3.00 off

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace	*6.50
Connellsville, foundry	7.50- 8.00
Connellsville prem. fdry.	7.75- 8.10
New River, foundry	8.50- 8.75
Wise county, foundry	8.00
Wise county, furnace	7.00

By-Product Foundry

Kearny, N. J., ovens	12.15
Chicago, outside delivered	11.50
Chicago, delivered	12.25
Terre Haute, delivered	12.00
Milwaukee, ovens	12.25
New England, delivered	13.75
St. Louis, delivered	†12.25
Birmingham, ovens	8.50
Indianapolis, delivered	12.00
Cincinnati, delivered	11.75
Cleveland, delivered	12.30
Buffalo, delivered	12.50
Detroit, delivered	12.25
Philadelphia, delivered	12.38

*Operators of hand-drawn ovens using trucked coal may charge $7.00, effective Feb. 3, 1943. †$12.75 from other than Ala., Mo., Tenn.

Coke By-Products

Spot, gal., freight allowed east of Omaha	
Pure and 90% benzol	15.00c
Toluol, two degree	28.00c
Solvent naphtha	27.00c
Industrial xylol	27.00c
Per lb. f.o.b. works	
Phenol (car lots, returnable drums)	12.50c
Do., less than car lots	13.25c
Do. tank cars	11.50c
Eastern Plants, per lb.	
Naphthalene flakes, balls, bbls., to jobbers	8.00c
Per ton, bulk, f.o.b. port	
Sulphate of ammonia	$29.30

Pig Iron

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 10, effective June 10, 1941. Exceptions indicated in footnotes. Allocation regulations from WPB Order M-17, expiring Dec. 31, 1942. Base prices bold face, delivered light face. Federal tax on freight charges, effective Dec. 1, 1942, not included in following prices.

	No. 2 Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$25.00	$24.50	$26.00	$25.50
Newark, N. J., del.	26.62	26.12	27.62	27.12
Brooklyn, N. Y., del.	27.65	.....	.....	28.15
Birdsboro, Pa., del	25.00	24.50	26.00	25.50
Birmingham, base	‡20.38	‡19.00	.....	.....
Baltimore, del.	25.67	.....	.....	.....
Boston, del.	25.12	.....	.....	.....
Chicago, del.	‡24.47	.....	.....	.....
Cincinnati, del.	24.30	22.92	.....	.....
Cleveland, del.	24.12	23.24	.....	.....
Newark, N. J., del.	26.24	.....	.....	.....
Philadelphia, del.	25.51	25.01	.....	.....
St. Louis, del.	‡24.12	23.24	.....	.....
Buffalo, base	24.00	23.00	25.00	24.50
Boston, del.	25.50	25.00	26.50	26.00
Rochester, del.	25.53	.....	26.53	26.03
Syracuse, del.	26.08 •	.....	27.08	26.58
Chicago, base	24.00	23.50	24.50	24.00
Milwaukee, del.	25.17	24.67	25.67	25.17
Muskegon, Mich., del.	27.38	.....	.....	27.38
Cleveland, base	24.00	23.50	24.50	24.00
Akron, Canton, O., del.	25.47	24.97	25.97	25.47
Detroit, base	24.00	23.50	24.50	24.00
Saginaw, Mich., del.	26.45	25.95	26.95	26.45
Duluth, base	24.50	24.00	25.00	24.50
St. Paul, del.	26.75	26.26	27.26	26.76
Erie, Pa., base	24.00	23.50	25.00	24.50
Everett, Mass., base	25.00	24.50	26.00	25.50
Boston	25.50	25.00	26.50	26.00
Granite City, Ill., base	24.00	23.50	24.50	24.00
St. Louis, del.	24.50	24.00	.....	24.50
Hamilton, O., base	24.00	23.50	.....	24.00
Cincinnati, del.	24.68	24.68	.....	25.35
Neville Island, Pa., base	24.00	23.50	24.50	24.00
§Pittsburgh, del., No. & So. sides	24.69	24.19	25.19	24.69
Provo, Utah, base	22.00	21.50	.....	.....
Sharpsville, Pa., base	24.00	23.50	24.50	24.00
Sparrows Point, Md., base	25.00	24.50	.....	.....
Baltimore, del.	26.05	.....	.....	.....
Steelton, Pa., base	.....	24.50	.....	25.50
Swedeland, Pa., base	25.00	24.50	26.00	25.50
Philadelphia, del.	25.89	25.39	.....	26.39
Toledo, O., base	24.00	23.50	24.50	24.00
Mansfield, O., del.	26.06	25.56	26.56	26.06
Youngstown, O., base	24.00	23.50	24.50	24.00

•Basic silicon grade (1.75-2.25%), add 50c for each 0.25%. ‡For phosphorus 0.70 and over deduct 38c. ‡Over 0.70 phos. §For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenridge 1.24.

High Silicon, Silvery

6.00-6.50 per cent (base).....$29.50
6.51-7.00..$30.50 9.01- 9.50 $35.50
7.01-7.50..31.50 9.51-10.00. 36.50
7.51-8.00..32.50 10.01-10.50. 37.50
8.01-8.50..33.50 10.51-11.00. 38.50
8.51-9.00..34.50 11.01-11.50. 39.50

F.o.b. Jackson county, O., per gross ton. Buffalo base prices are $1.25 higher. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton.

Charcoal Pig Iron

Northern

Lake Superior Furn. $28.00
Chicago, del. 31.54

(For higher silicon irons a differential over and above the price of base grades is charged as well as for the hard chilling irons, Nos. 5 and 6.)

Southern

Semi-cold blast, high phos., f.o.b. furnace, Lyles, Tenn..$28.50
Semi-cold blast, low phos., f.o.b. furnace, Lyles, Tenn.. 33.00

Gray Forge

Neville Island, Pa. $23.50
Valley, base 23.50

Low Phosphorus

Basing points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $29.50 base; $30.81, delivered, Philadelphia.

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differentials: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorous Differential: Basing point prices are subject to a reduction of 38 cents a ton for phosphorous content of 0.70% and over.

Manganese Differentials: Basing point prices subject to an additional charge not to exceed 50 cents a ton for each 0.50% manganese content in excess of 1.0%.

Ceiling Prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Exceptions to Ceiling Prices: Pittsburgh Coke & Iron Co. (Sharpsville, Pa. furnace only) and Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic, Bessemer and Malleable. Mystic Iron Works, Everett, Mass., may exceed basing point prices by $1 per ton, effective April 20, 1942. Chester, Pa., furnace of Pittsburgh Coke & Iron Co. may exceed basing point prices by $2.25 per ton, effective July 27, 1942.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky. $64.60

First Quality

Pa., Ill., Md., Mo., Ky..... 51.30
Alabama, Georgia 51.30
New Jersey 56.00
Ohio 43.00

Second Quality

Pa., Ill., Md., Mo., Ky. 46.55
Alabama, Georgia 38.00
New Jersey 49.00
Ohio 36.00

Malleable Bung Brick

All bases $59.85

Silica Brick

Pennsylvania $51.30
Joliet, E. Chicago 58.90
Birmingham, Ala. 51.30

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press $31.00
Wire cut 29.00

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk..... 22.00
net ton, bags 26.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick $54.00
Chem. bonded chrome 54.00
Magnesite brick 76.00
Chem. bonded magnesite 65.00

Fluorspar

Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail $25.00-28.00
Do., barge 25.00-28.00
No. 2 lump 25.00-28.00

(Prices effective Nov. 23, 1942)

Ferroalloy Prices

Ferromanganese: 78-82%, carlots, gross ton, duty paid, Atlantic ports, $135; Del. Pittsburgh $140.65; f.o.b. Southern furnaces $135; Add $6 per gross ton for packed carloads $10 for ton, $13.50 for less-ton and $18 for less than 200-lb. lots, packed.

Spiegeleisen: 19-21%, carlots per gross ton. Palmerton, Pa. $36.

Electrolytic manganese: 99.9% plus, less ton lots, per lb. 42.00c. Ton lots 40.00c. Annual contracts 38.00c.

Chromium Metal: Per lb. contained chromium in gross ton lots, contract basis, freight allowed, 98% 80.00c, 88% 79.00c, Spot prices 5 cents per lb. higher.

Ferrocolumbium: 50-60%, per lb. contained columbium in gross ton lots, contract basis, f.o.b. Niagara Falls, N. Y. $2.25; less-ton lots $2.30. Spot prices 10 cents per lb. higher.

Ferrochrome: 66-70%; per lb. contained chromium in carloads, freight allowed, 4-6% carbon 13.00c; ton lots 13.75c; less-ton lots 14.00c; less than 200-lb. lots 14.25c. 66-72%, low carbon grades:

	Car loads	Ton lots	Less ton	Less 200 lbs.
2% C.	19.50c	20.25c	20.75c	21.00c
1% C.	20.50c	21.25c	21.75c	22.00c
0.20% C.	21.50c	22.25c	22.75c	23.00c
0.10% C.	22.50c	23.25c	23.75c	24.00c

Spot is ¼c higher

Chromium briquets: Contract basis in carloads per lb., freight allowed 8.25c; packed 8.50c; gross ton lots 8.75c; less-ton lots 9.00c; less 200-lb. lots 9.25c. Spot prices ¼-cent higher.

Ferromolybdenum: 55-75%, per lb. contained molybdenum, f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Calcium Molybdate (Molyte): 40-45%, per lb. contained molybdenum, contract basis, f.o.b. Langeloth and Washington, Pa., any quantity, 80.00c.

Molybdic Oxide Briquets: 48-52%, per lb. contained molybdenum, f.o.b. Langeloth, Pa., any quantity 80.00c.

Molybdenum Oxide: 53-63%, per lb. contained molybdenum in 5 and 20 lb. molybdenum contained cans, f.o.b. Langeloth and Washington, Pa., any quantity 80.00c.

Molybdenum Powder: 99% per lb. in 200-lb. kegs, f.o.b. York, Pa. $2.60; 100-200 lb. lots $2.75; under 100-lb. lots $3.00.

Ferrophosphorus: 17-19%, based on 18% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrophosphorus: 23-26%, based on 24% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Mt. Pleasant, Tenn.; contract price $75, spot $80.

Ferrosilicon: Contract basis in gross tons per carload, bulk, freight allowed; unitage applies to each 1% silicon above or below base.

	Carloads	Ton lots
50%	$ 74.50	$ 87.00
Unitage	1.50	1.75
75%	135.00	151.00
Unitage	1.80	2.00
85%	170.00	188.00
Unitage	2.00	2.20
90-95%	10.25c	11.25c

Spot prices ¼-cent higher.

Silicon Metal: Contract basis per lb., f.o.b. producers plants, freight allowed; 1% iron; carlots 14.50c, ton lots 15.00c, less-ton lots 15.25c, less 200 lbs. 15.50c.

Silicon Metal: Contract basis per lb.; 2% iron; carlots 13.00c, ton lots 13.50c, less-ton lots 13.75c, less 200 lbs. 14.00c. Spot prices ¼-cent higher.

Silicon Briquets: Contract basis; in carloads, bulk freight allowed, per ton $74.50; packed $80.50; ton lots $84.50; less-ton lots per lb. 4.00c; less 200-lb. lots per lb. 4.25c. Spot ¼-cent per lb. higher on less-ton lots; $5 per ton higher on ton lots and over.

Silicomanganese: Contract basis freight allowed, 1½% carbon; in carloads per gross ton $135; ton lots $147.50. Spot $5 per ton higher.

Silico-manganese Briquets: Contract basis in carloads per pound, bulk freight allowed 5.80c; packed 6.05c; ton lots 6.30c; less-ton lots 6.55c; less 200-lb. lots 6.80c. Spot prices ¼-cent higher.

Ferrotungsten: Carlots, per lb. contained tungsten, $1.90.

Tungsten Metal Powder: 98-99%, per lb any quantity $2.55-2.65.

Ferrotitanium: 40-45%, f.o.b. Niagara Falls, N. Y., per lb. contained titanium; ton lots $1.23; less-ton lots $1.25. Spot up 5 cents per lb.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots $1.35; less-ton lots $1.40. Spot 5 cents per lb. higher.

High-Carbon Ferrotitanium: 15-20%, Contract basis, per gross ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and North of Baltimore and St. Louis, 6-8% carbon $142.50; 3-5% carbon $157.50.

Ferrovanadium: 35-40%, contract basis, per lb. contained vanadium, f.o.b. producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Vanadium Pentoxide: Technical grade, 88-92 per cent V_2O_5; contracts, any quantity, $1.10 per pound V_2O_5 contained; spot 5 cents up.

Zirconium Alloys: 12-15%, contract basis, carloads bulk, per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot $5 per ton higher.

Zirconium alloy: 35-40%, contract basis, carloads in bulk or package, per lb. of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot ¼-cent higher.

Alsifer: (Approx. 20% aluminum, 40% silicon, 40% iron) Contract basis, f.o.b. Niagara Falls, N. Y., per lb. 7.50c; ton lots 8.00c. Spot ½-cent higher.

Simanal: (Approx. 20% each silicon, manganese, aluminum) Contract basis, freight allowed, per lb. of alloy; carlots 10.00c; ton lots 10.50c, less ton lots, 11.00c.

Borosil: 3 to 4% boron, 40 to 45% Si., $7 lb. cont Bo., f.o.b. Philo, O.

WAREHOUSE STEEL PRICES

Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials. As of April 16, 1941

	Hot rolled bars	Structural shapes	Plates	Floor plates	Hot rolled sheets (10 gage base)	Hot rolled bands (12 gage and heavier)	Hot rolled hoops (14 gage and lighter)	Galvanized flat sheets (24 gage base)	Cold rolled sheets (17 gage base)	Cold finished bars	Cold-rolled strip	AISI hot bars 2300 series	AISI hot bars 3100 series
Boston	3.98[1]	3.85[1]	3.85[1]	5.66[1]	3.71[1]	4.06[1]	5.06[1]	5.11[14]	4.68[14]	4.13[21]	3.46	7.75[30]	6.05[30]
New York	3.84[1]	3.75[1]	3.76[1]	5.56[1]	3.58[1]	3.96[1]	3.96[1]	5.00[13]	4.60[1]	4.09[21]	3.51	7.60[30]	5.90[30]
Philadelphia	3.85[1]	3.55[1]	3.55[1]	5.25[1]	3.55[1]	3.95[1]	4.45[1]	4.90[16]	4.63[16]	4.06[21]	3.31	7.56[30]	5.86[30]
Baltimore (city)	3.85[1]	3.70[1]	3.70[1]	5.25[1]	3.50[1]	4.00[1]	4.35[1]	5.05[17]	5.00[20]	4.04[21]	....	....	....
Baltimore (country)	3.85[1]	3.70[1]	3.45[1]	5.25[1]	3.25[1]	4.00[1]	4.35[1]	4.75[17]	5.00[20]	4.04[21]	....	....	....
Washington, D. C.	3.95[1]	3.80[1]	3.80[1]	5.35[1]	3.60[1]	4.10[1]	4.45[1]	5.13[17]	5.10[20]	4.03[21]	....	....	....
Norfolk, Va.	4.00[1]	4.05[1]	4.05[1]	5.45[1]	3.85[1]	4.10[1]	4.10[1]	5.40[17]	4.50[24]	4.15[21]	....	....	....
Bethlehem, Pa.*	....	3.45[1]	....	....	....	....	....	....	....	....	....	....	....
Claymont, Del.*	....	....	3.45[1]	....	....	....	....	....	....	....	....	....	....
Coatesville, Pa.*	....	....	3.45[1]	....	....	....	....	....	....	....	....	....	....
Buffalo (city)	3.35[1]	3.40[1]	3.62[1]	5.25[1]	3.25[1]	3.82[1]	3.82[1]	4.75[13]	4.30[10]	3.75[21]	3.52	7.35[30]	5.65[30]
Buffalo (country)	3.25[1]	3.30[1]	3.62[1]	5.25[1]	3.15[1]	3.82[1]	3.82[1]	4.65[13]	4.20[10]	3.65[21]	....	....	....
Pittsburgh (city)	3.35[1]	3.40[1]	3.40[1]	5.00[1]	3.35[1]	3.60[1]	3.60[1]	4.75[13]	4.00[24]	3.65[21]	....	7.45[30]	5.75[30]
Pittsburgh (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.50[1]	3.50[1]	4.65[13]	4.00[24]	3.65[21]	....	....	....
Cleveland (city)	3.25[1]	3.58[1]	3.40[1]	5.18[1]	3.35[1]	3.50[1]	3.50[1]	4.62[13]	4.05[24]	3.75[21]	3.20	7.55[23]	5.85[30]
Cleveland (country)	3.25[1]	3.58[1]	3.30[1]	5.18[1]	3.25[1]	3.50[1]	3.50[1]	4.62[13]	3.95[24]	3.65[21]	....	....	....
Detroit	3.43[1]	3.65[1]	3.60[1]	5.27[1]	3.43[1]	3.43[1]	3.68[1]	4.84[13]	4.30[24]	3.80[21]	3.40	7.67[23]	5.97[30]
Omaha (city)	4.10[1]	4.15[1]	4.15[1]	5.75[1]	3.85[1]	4.20[1]	4.20[1]	5.52[10]	4.77[24]	4.42[21]	....	....	....
Omaha (country)	4.00[1]	4.05[1]	4.05[1]	5.65[1]	3.75[1]	4.10[1]	4.10[1]	5.52[10]	4.77[24]	4.42[21]	....	....	....
Cincinnati	3.60[1]	3.68[1]	3.65[1]	5.28[1]	3.42[1]	3.67[1]	3.67[1]	4.92[10]	4.37[24]	4.00[21]	3.45	7.69[23]	5.99[30]
Youngstown, O.*	....	....	....	....	....	....	....	4.40[13]	....	....	....	....	....
Middletown, O.*	....	....	....	....	3.25[1]	3.50[1]	3.50[1]	4.40[13]	....	....	....	....	....
Chicago (city)	3.50[1]	3.55[1]	3.55[1]	5.15[1]	3.25[1]	3.60[1]	3.60[1]	4.85[10]	4.10[24]	3.75[21]	3.50	7.35[23]	5.65[30]
Chicago (country)	3.40[1]	3.45[1]	3.45[1]	5.05[1]	3.15[1]	3.50[1]	3.50[1]	4.75[10]	4.00[24]	3.65[21]	....	....	....
Milwaukee	3.63[1]	3.68[1]	3.68[1]	5.28[1]	3.38[1]	3.73[1]	3.73[1]	4.98[10]	4.23[24]	3.88[21]	3.54	7.33[23]	5.88[30]
St. Paul	3.75[1]	3.80[1]	3.80[1]	5.40[1]	3.50[1]	3.85[1]	3.85[1]	5.00[1]	4.35[1]	4.34[21]	3.83	7.70[23]	6.00[30]
St. Louis	3.64[1]	3.69[1]	3.69[1]	5.29[1]	3.39[1]	3.74[1]	3.74[1]	4.99[10]	4.24[24]	4.02[21]	3.61	7.72[23]	6.02[30]
Indianapolis (city)	3.60[1]	3.70[1]	3.70[1]	5.30[1]	3.45[1]	3.75[1]	3.75[1]	5.01[10]	4.25[24]	3.97[21]	....	....	....
Indianapolis (country)	3.35[1]	3.45[1]	3.40[1]	5.05[1]	3.20[1]	3.50[1]	3.50[1]	5.01[10]	4.00[24]	3.97[21]	....	....	....
Memphis, Tenn.	3.90[5]	3.95[5]	3.95[5]	5.71[5]	3.85[5]	4.10[5]	4.10[5]	5.25[11]	4.66[24]	4.31[21]	....	....	....
Birmingham (city)	3.50[5]	3.55[5]	3.55[5]	5.83[5]	3.45[5]	3.70[5]	3.70[5]	4.75[10]	4.78[24]	4.43[21]	....	....	....
Birmingham (country)	3.40[5]	3.45[5]	3.45[5]	5.83[5]	3.35[5]	3.60[5]	3.60[5]	4.75[10]	4.78[24]	4.43[21]	....	....	....
New Orleans (city)	4.10[4]	3.90[4]	3.90[4]	5.85[4]	3.95[4]	4.20[4]	4.20[4]	5.25[26]	4.95[10]	4.60[21]	5.00	....	....
New Orleans (country)	4.00[4]	3.80[4]	3.80[4]	5.75[4]	3.85[4]	4.10[4]	4.10[4]	5.15[26]	4.95[10]	4.60[21]	....	....	....
Houston, Tex.	3.75[5]	4.25[5]	4.25[5]	5.50[5]	3.75[5]	4.30[5]	4.30[5]	5.25[26]	5.43[10]	4.50[22]	....	....	....
Los Angeles	4.35[4]	4.60[4]	4.90[4]	7.15[4]	4.95[4]	4.90[4]	6.70[4]	5.95[13]	7.15[6]	5.70[22]	....	9.55[23]	8.55[30]
San Francisco (city)	3.95[7]	4.35[7]	4.65[7]	6.35[7]	4.55[7]	4.50[7]	4.50[7]	6.60[13]	7.55[13]	5.55[22]	....	9.80[23]	8.80[30]
San Francisco (country)	3.85[7]	4.25[7]	4.55[7]	6.25[7]	4.45[7]	4.40[7]	4.40[7]	6.50[13]	7.45[13]	5.45[22]	....	....	....
Tacoma	4.20[6]	4.45[6]	4.75[6]	6.50[6]	4.65[6]	4.25[6]	5.45[6]	5.70[6]	6.63[24]	5.75[22]	....	....	....
Seattle (city)	4.20[6]	4.45[6]	4.75[6]	6.50[6]	4.65[6]	4.35[6]	5.45[6]	5.70[6]	6.63[24]	5.75[22]	....	....	8.00[6]

*Basing point cities against which warehouses equalized freight as of April 16, 1941, and which must now be used in calculating lowest combination prices.

NOTE—All prices except cold-rolled strip and AISI hot-rolled bars fixed by Office of Price Administration in amendment No. 10 to Revised Price Schedule No. 49.

BASE QUANTITIES

[1]—400 to 1999 pounds; [2]—400 to 14,999 pounds; [3]—any quantity; [4]—300 to 1999 pounds; [5]—400 to 3999 pounds; [6]—300 to 1999 pounds; [7]—400 to 39,999 pounds; [8]—under 2000 pounds; [9]—under 4000 pounds; [10]—500 to 1499 pounds; [11]—one bundle to 39,999 pounds; [12]—150 to 2249 pounds; [13]—150 to 1499 pounds; [14]—three to 24 bundles; [15]—450 to 1499 pounds; [16]—one bundle to 1499 pounds; [17]—one to nine bundles; [18]—one to six bundles; [19]—100 to 749 pounds; [20]—300 to 1999 pounds; [21]—1500 to 39,999 pounds; [22]—1500 to 1999 pounds; [23]—1000 to 39,999 pounds; [24]—400 to 1499 pounds; [26]—1000 to 1999 pounds; [30]—under 25 bundles. Cold-rolled strip, any quantity is base.

Ores

Lake Superior Iron Ore

Gross ton, 51½% Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic 56-63%, contract	13.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% f.o.b. Rio de Janeiro	7.50-8.00c

Tungsten Ore

Chinese wolframite, per short ton unit, duty paid	$24.00

Chrome Ore

(Equivalent OPA schedules):

Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Ore., or Tacoma, Wash.

(S/S paying for discharging; dry basis; subject to penalties if guarantees are not met.)

Indian and African	
48% 2.8:1	41.00
48% 3:1	43.50
48% no ratio	31.00
South African (Transvaal)	
44% no ratio	27.40
45% no ratio	28.30
48% no ratio	31.00
50% no ratio	32.80
Brazilian—nominal	
44% 2.5:1 lump	33.65
48% 3:1 lump	43.50
Rhodesian	
45% no ratio	28.30
48% no ratio	31.00
48% 3:1 lump	43.50
Domestic (f.o.b. Columbus, Mont.)	
48% 3:1	43.50

less $7 freight allowance

Manganese Ore

Including war risk but not duty, cents per gross-ton unit, dry, f.o.b. cars, New Orleans and Mobile; 5 cents higher at Norfolk, Baltimore, Philadelphia, New York; adjustments for analysis variations. (Based on OPA schedules.)

Brazilian, 48%	73.8c
Brazilian, 46%	71.8c
Caucasian, 51%	75.3c
Caucasian, 50%	74.8c
Chilean, 48%	73.8c
Indian, 50%	74.8c
Indian, 48%	73.8c
South African, 48%	73.8c
South African, 46%	71.8c
(Duty Free)	
Cuban, 51%	86.5c
Cuban, 48%	85.0c
Cuban, 45%	82.0c
Philippine, 50%	85.0c
Domestic, 48%, f.o.b. mines	96.0c

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

NATIONAL EMERGENCY STEELS (Hot Rolled)

Designation	Chemical Composition Limits, Per Cent—Carbon	Mn.	Si.	Cr.	Ni.	Mo.	Basic open-hearth Bars per 100 lb.	Basic open-hearth Billets per G T	Electric furnace Bars per 100 lb.	Electric furnace Billets per G T
NE 1330	.28-.33	1.60-1.90	.20-.35	.....	.....	.....	$ .10	$2.00	....	....
NE 8020	.18-.23	1.00-1.30	.20-.35	.....	.....	.10-.20	.45	9.00	$.95	$19.00
NE 8442	.40-.45	1.30-1.60	.20-.35	.....	.....	.30-.40	.90	18.00	1.40	28.00
NE 8613	.12-.17	.70- .90	.20-.35	.40-.60	.40-.70	.15-.25	.75	15.00	1.25	25.00
NE 8720	.13-.18	.70- .90	.20-.35	.40-.60	.40-.70	.20-.30	.80	16.00	1.30	26.00
NE 9253	.50-.60	.75-1.00	1.80-2.20	.....	.....	.....	.40	8.00	....	....
NE 9262	.55-.65	.75-1.00	1.80-2.20	.20-.40	.....	.....	.65	13.00	....	....
NE 9415	.13-.18	.80-1.10	.40-.60	.20-.40	.20-.50	.08-.15	.80	16.00	1.30	26.00
NE 9442	.40-.45	1.00-1.30	.40-.60	.20-.40	.20-.50	.08-.15	.85	17.00	1.35	27.00
NE 9587	.35-.40	1.20-1.50	.40-.60	.40-.60	.40-.70	.15-.25	1.20	24.00	1.70	34.00
NE 9630	.28-.33	1.20-1.50	.40-.60	.40-.60	.....	.....	.80	16.00	1.30	26.00
NE 9642	.40-.45	1.30-1.60	.40-.60	.40-.60	.....	.....	.85	17.00	1.35	27.00

Extras are in addition to a base price of 2.70c, per 100 lb., on finished products and $54 per gross ton on semifinished steel major basing points and are in cents per 100 lb. and dollars per gross ton in semifinished. No prices quoted on vanadium alloy.

MAXIMUM PRICES FIXED BY OPA ON IRON AND STEEL SCRAP

Other than railroad grades quoted on the basis of basing point prices from which shipping point prices and consumers' delivered prices are to be computed. Scrap originating from railroads quoted delivered to consumers' plants located on the line of the railroad from which the material originated. All prices in gross tons. A basing point includes its switching district.

PRICES FOR OTHER THAN RAILROAD SCRAP

	OPEN HEARTH GRADES*	Mixed Bor., Turn., Machine Turnings	Cast Iron Borings	Shoveling Turnings
Pittsburgh, Brackenridge, Butler, Johnstown, Midland, Monessen, Sharon, Steubenville, Weirton, Canton, Youngstown, Warren	$20.00	$15.00	$16.00	$17.00
Claymont, Coatesville, Harrisburg, Conshohocken, Phoenixville	18.75	13.75	14.75	15.75
Bethlehem	18.25	13.25	14.25	15.25
Buffalo	19.25	14.25	15.25	16.25
Cleveland, Middletown, Cincinnati, Portsmouth, Ashland	19.50	14.50	15.50	16.50
Detroit	17.85	12.85	13.85	14.85
Toledo	†15.35	12.85	13.85	14.85
Chicago	18.75	13.75	14.75	15.75
Kokomo	18.25	13.25	14.25	15.25
Duluth	18.00	13.00	14.00	15.00
St. Louis	17.50	12.50	13.50	14.50
Birmingham, Atlanta, Alabama City, Los Angeles, San Francisco, Pittsburg, Calif.	17.00	12.00	13.00	14.00
Minnequa, Colo.	16.50	11.50	12.50	13.50
Seattle	14.50	9.50	10.50	11.50

RAILROAD SCRAP

	Heavy Melting Steel	Scrap Rails	Rails for Rolling	Scrap Rails: 3 ft. and under	Scrap Rails: 2 ft. and under	Scrap Rails: 18 in. and under
Pittsburgh, Wheeling, Steubenville, Sharon, Youngstown, Canton	$21.00	$22.00	$23.50	$24.00	$24.25	$24.50
Philadelphia, Wilmington, Sparrows Point	19.75	20.75	22.25	22.75	23.00	23.25
Cleveland, Cincinnati, Middletown, Ashland, Portsmouth	20.50	21.50	23.00	23.50	23.75	24.00
Chicago	19.75	20.75	22.25	22.75	23.00	23.25
Buffalo	20.25	21.25	22.75	23.25	23.50	23.75
Detroit	18.85	19.85	21.35	21.85	22.10	22.35
Kokomo	19.25	20.25	21.75	22.25	22.50	22.75
Duluth	19.00	20.00	21.50	22.00	22.25	22.50
Kansas City, Mo.	17.00	18.00	19.50	20.00	20.25	20.50
St. Louis	18.50	19.50	21.00	21.50	21.75	22.00
Birmingham	18.00	19.00	20.50	21.00	21.25	21.50
Los Angeles, San Francisco	18.00	19.00	20.50	21.00	21.25	21.50
Seattle	15.50	16.50	18.00	18.50	18.75	19.00

CAST IRON SCRAP OTHER THAN RAILROAD

(Shipping point prices in gross tons)

	Group A	Group B	Group C
No. 1 Cupola Cast	$18.00	$19.00	$20.00
No. 1 Machinery Cast, Drop Broken, 150 lbs. & Under	18.00	19.00	20.00
Clean Auto Cast	18.00	19.00	20.00
Stove Plate	17.00	18.00	19.00
Unstripped Motor Blocks	15.50	16.50	17.50
Heavy Breakable Cast	15.50	16.50	17.50
Charging Box Size Cast	17.00	18.00	19.00
Miscellaneous Malleable	20.00	21.00	22.00

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.
Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida.
Group C includes states not named in groups A and B, plus Kansas City, Kans.-Mo.

*Open Hearth Grades refer to No. 1 heavy melting steel, No. 1 hydraulic compressed black sheet scrap, No. 2 heavy melting steel, dealers' No. 1 bundles, dealers' No. 2 bundles and No. 1 busheling. No. 1 chem. borings, 1 per cent oil, $1 under, No. 2, 1.5 per cent oil, $2 under heavy melting steel. No. 3 bundles, $2 under No. 1 heavy melting; cast steel, $2.50 over, No. 2 busheling, $2.50 under No. 1 heavy melting steel, auto springs, crankshafts, $1 over No. 1 heavy melting. †Toledo open-hearth grades cover only No. 2 busheling.

A basing point includes the switching district of the city named. The Pittsburgh basing point includes the switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport, Pa. Cincinnati basing point includes the switching district of Newport, Ky. St. Louis basing point includes the switching districts of Granite City, East St. Louis and Madison, Ill. San Francisco basing point includes the switching districts of South San Francisco, Niles and Oakland, Calif.

ELECTRIC FURNACE, ACID OPEN-HEARTH AND FOUNDRY GRADES

	Low Phos. Grades: Billet, Bloom Forge Crops	Low Phos. Grades: Bar Crops and smaller; Punchings, Plate	Heavy Structural, Plate: 3 ft. and less	Heavy Structural, Plate: 2 ft. and less	Heavy Structural, Plate: 1 ft. and less	Foundry Steel: 2 ft. and less	Foundry Steel: 1 ft. and less	Alloy-Free Low Phos. & Sulphur Turnings	First Cut Heavy Axle & Forge Turnings	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Johnstown, Midland, Monessen, Sharon, Steubenville, Weirton, Canton, Youngstown, Warren	$25.00	$22.50	$21.50	$22.00	$22.50	$21.50	$22.00	$18.00	$19.50	$21.00
Claymont, Coatesville, Harrisburg, Conshohocken, Phoenixville	23.75	21.25	20.25	20.75	21.25	20.25	20.75	16.75	18.25	19.75
Bethlehem	23.25	20.75	19.75	20.25	20.75	19.75	20.25	16.25	17.75	19.25
Buffalo	24.25	21.75	20.75	21.25	21.75	20.75	21.25	17.25	18.75	20.25
Cleveland, Middletown, Cincinnati, Portsmouth, Ashland	24.50	22.00	21.00	21.50	22.00	21.00	21.50	17.50	19.00	20.50
Detroit	22.85	20.35	19.35	19.85	20.35	19.35	19.85	15.85	17.35	18.85
Toledo	.	.	.	.	.	.	.	.	.	.
Chicago	23.75	21.25	20.25	20.75	21.25	20.25	20.75	16.75	18.25	19.75
Kokomo	23.25	20.75	19.75	20.25	20.75	19.75	20.25	16.25	17.75	19.25
Duluth	23.00	20.50	19.50	20.00	20.50	19.50	20.00	16.00	17.50	19.00
St. Louis	22.50	20.00	19.00	19.50	20.00	19.00	19.50	15.50	17.00	18.50
Birmingham, Atlanta, Alabama City, Los Angeles, San Francisco, Pittsburg, Calif.	22.00	19.50	18.50	19.00	19.50	18.50	19.00	15.00	16.50	18.00
Minnequa, Colo.	21.50	19.00	18.00	18.50	19.00	18.00	18.50	14.50	16.00	17.50
Seattle	19.50	17.00	16.00	16.50	17.00	16.00	16.50	12.50	14.00	15.50

Inferior Grades: Maximum prices of inferior grades shall continue to bear the same differential below the corresponding listed grades as existed from Sept. 1, 1940, to Jan. 31, 1941. No premium allowed on grades considered superior, unless approved by OPA. Addition of special preparation charges prohibited. Purchase of electric furnace or foundry grades for open hearth or blast furnace use permitted only at no more than price for corresponding open hearth grade. Exceptions: Low phos. billet, bloom and forge crops and electric furnace bundles may exceed open hearth price, and electric furnace bundles may exceed blast furnace price, if material is delivered to the consumer direct from the original industrial producer.

Commissions: No commission is payable except by a consumer to a broker for services rendered, the commission not to exceed 50 cents per gross ton. No commission is payable unless: The broker guarantees the quality and delivery of an agreed tonnage the scrap is purchased at a price no higher than the maximum allowed; the broker sells the scrap to the consumer at the same price at which he purchased it; the broker does not split the commission with the seller of the scrap, with another broker or sub-broker, or with the consumer. Commissions must be shown as separate item on invoice.

Maximum Shipping Point Price: Where shipment to consumer is by rail, vessel or combination of both, scrap is at its shipping point when it has been placed f.o.b. railroad car or f.a.s. vessel. In such cases, maximum shipping point prices are: (1) For shipping points located within a basing point, the price listed in the above table for scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point; and (2) for shipping points located outside a basing point, the price in the above table for scrap at the most favorable basing point, minus the lowest transportation charge by rail, water or combination thereof. When vessel movement is involved, dock charges shall be 50 cents at Memphis, $1 at Great Lakes ports, $1.25 at New England ports, 75 cents elsewhere. New England shipping point prices computed on most favorable basing point prices; maximum transportation charge on scrap from New England, $6.65 per ton.

Scrap shipped by motor vehicle is at its shipping point when loaded. For shipping points within basing points, maximum is price listed in table minus lowest switching charge. When outside basing point, maximum is price at most favorable basing point minus lowest established charge when hauled by common carrier. When hauled by seller charges are based on carload rate for rail shipment, minimum $1.00 per ton.

Maximum Delivered Prices: Determined by adding established transportation charges to shipping point price, not to exceed by more than $1 (plus freight rate increase March 18, 1942) the prices listed in the table for the nearest basing point. Certain exceptions specified in Revised Price Schedule No. 4 (Amendment 1) apply to St. Louis district consumers, to WPB allocations, to water shipments from Duluth or Superior, Wis., to shipments of billets, blooms and forge crops from Pittsburgh and to shipments of electric and foundry grades from Michigan; to shipments of turnings to ferroalloy producers and of borings to chemical users. Delivered prices of scrap shipped under WPB allocations may exceed prices at nearest basing point by more than $1, if most economical transportation is used.

Unprepared Scrap: Above prices are for prepared scrap. Maximum prices for unprepared scrap are $3.50 less; (material from which Nos. 1, 2 and 3 bundles made is $4 less) than for the corresponding grades of prepared scrap, except for heavy breakable cast. In no case shall electric furnace and foundry grades be used as the 'corresponding grades of prepared scrap."

Remote Scrap: Consists of all grades, except railroad scrap, in Florida, Montana, Idaho, Wyoming, Nevada, Arizona, New Mexico, Texas, Oklahoma, Oregon, Washington, Louisiana, Utah. Delivered price may exceed by not more than $5 the price at the basing point nearest consumer's plant, provided sworn details furnished OPA. Permission required to exceed by more than $5 the nearest basing point price. Colorado scrap is remote scrap for Colorado consumers only.

NONFERROUS METAL PRICES

Copper: Electrolytic or Lake from producers in carlots 12.00c, Del. Conn., less carlots 12.12½, refinery; dealers may add ¾c for 5000 lbs. to carload; 1000-4999 lbs. 1c; 500-999 1½c; 0-499 2c. Casting, 11.75c, refinery for 20,000 lbs., or more, 12.00c less than 20,000 lbs.

Brass Ingot: Carlot prices, including 25 cents per hundred freight allowance; add ¼c for less than 20 tons; 85-5-5-5 (No. 115) 12.25c; 88-10-2 (No. 215) 16.50c; 80-10-10 (No. 305) 14.25c; Navy G (No. 225) 16.75c; Navy M (No. 245) 14.75c; No. 1 yellow (No. 405) 10.00c; manganese bronze (No. 420) 12.75c.

Zinc: Prime western 8.25c, select 8.35c, brass special 8.50c, intermediate 8.75c, E. St. Louis, for carlots. For 20,000 lbs. to carlots add 0.15c; 10,000-20,000 0.25c; 2000-10,000 0.40c; under 2000 0.50c.

Lead: Common 6.35c, corroding or chemical, 6.40c, E. St. Louis for carlots; add 5 points for Chicago, Minneapolis-St. Paul, Milwaukee-Kenosha districts; add 15 points for Cleveland-Akron-Detroit area, New Jersey, New York State, Texas, Pacific Coast, Richmond, Indianapolis-Kokomo; add 20 points for Birmingham, Connecticut, Boston-Worcester-Springfield, New Hampshire, Rhode Island.

Primary Aluminum: 99% plus, ingots 15.00c del., pigs 14.00c del.; metallurgical 94% min. 13.50c del. Base 10,000 lbs. and over; add ½c 2000-9999 lbs.; 1c less than 2000 lbs.

Secondary Aluminum: All grades 15.00c per lb. except as follows: Low-grade piston alloy (No. 122 type) 14.50c; No. 12 foundry alloy (No. 2 grade) 14.50c; chemical warfare service ingot (99½% plus) 14.50c; steel deoxidizers in notchbars, granulated or shot, including ingot containing over 2% iron, Grade 1 (95-97½%) 14.75c, Grade 2 (92-95%) 14.50c, Grade 3 (90-92%) 14.00c, Grade 4 (85-90%) 13.50c, Grade 5 (less than 85%) 12.50c. Above prices for 30,000 lbs. or more; add ¼c 10,000-30,000 lbs.; ½c 1000-10,000 lbs.; 1c less than 1000 lbs. Prices include freight at carload rate up to 75 cents per hundred.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lbs.) 20.50c lb.; add 1c for special shapes and sizes, including 3-lb. ingot and 12-lb. round ingot; incendiary bomb alloy 23.40c, 50-50 magnesium-aluminum 23.75c, ASTM B80-41T No. 11 25.00c, ASTM B94-40T No. 13 25.00c, all others 23.00c. Prices for 100 lbs. or more; for 25-100 lbs. add 10c; for less than 25 lbs. 20c; incendiary bomb alloy f.o.b. plant any quantity; carload freight rate allowed all others for 500 lbs. or more.

Tin: Prices ex-dock, New York in 5-ton lots. Add 1 cent for 2240-11,199 lbs., 1½c 1000-2239, 2½c 500-999, 3c under 500. Grade A, 99.8% or higher (includes Straits), 52.00c; Grade B, 99.75-99.79% incl. 51.62½c; Grade C, Cornish refined 51.62½c; Grade D, 99.0-99.74% incl. 51.12½c, Grade E, below 99%, 51.00c.

Antimony: American, bulk, carlots, f.o.b. Laredo, Tex., 99.0-99.8% grade 14.50c, 99.8% and over (arsenic 0.05% max.; no other impurity to exceed 0.1% 15.00c. Add ¼c for less-carlots to 10,000 lbs.; ½c for 9999-224 lbs.; 2c for 223 lbs. and less.

Nickel: Electrolytic cathodes, 99.5%, f.o.b. refinery 35.00c lb.; pig and shot produced from electrolytic cathodes 36.00c; "F" nickel shot or ingot for additions to cast iron, 34.00c; Monel shot 28.00c.

Mercury: Prices per 76-lb. flask f.o.b. point of shipment or entry. Domestic produced in Calif., Oreg., Wash., Idaho, Nev., Ariz, $191; produced in Texas, Ark. $193. Foreign, produced in Mexico, duty paid, $193.

Arsenic: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be., $15 lb. contained Be.

Cadmium: Bars, ingots, pencils, pigs, plates, rods, slabs, sticks and all other "regular" straight or flat forms 90.00c lb., del.; anodes, balls, discs and all other special or patented shapes 95.00c lb. del.

Cobalt: 97-99%, $2.11 lb.; 100 lbs. or more on contract, $1.50 lb.

Indium: 99.5%, $10 per troy ounce.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, N. Y., 44.75c per ounce.

Platinum: $36 per ounce.

Iridium: $165 per troy ounce.

Palladium: $24 per troy ounce.

Rolled Drawn, Extruded Products

(Copper and brass product prices based on 12.00c, Conn., for copper. Freight prepaid on 100 lbs. or more.)

Sheet: Copper 20.87c; yellow brass 19.48c; commercial bronze, 90% 21.07c, 95% 21.28c; red brass, 80% 20.15c, 85% 20.36c; phosphor bronze, Grades A, B 5% 36.25c; Everdur, Herculoy, Duronze or equiv. 26.00c; naval brass 24.50c; manganese bronze 28.00c; Muntz metal 22.75c; nickel silver 5% 26.50c.

Rods: Copper, hot-rolled 17.37c, cold-rolled 18.37c; yellow brass 15.01c; commercial bronze 90% 21.32c, 95% 21.53c; red brass 80% 20.40c, 85% 20.61c; phosphor bronze Grade A, B 5% 36.50c; Everdur, Herculoy, Duronze or equiv. 25.50c; Naval brass 19.12c; manganese bronze 22.50c; Muntz metal 18.87c; nickel silver 5% 28.75c.

Seamless Tubing: Copper 21.37c; yellow brass 22.23c; commercial bronze 90% 23.47c; red brass 80% 22.80c, 85% 23.01c.

Extruded Shapes: Copper 20.87c; architectural bronze 19.12c; manganese bronze 24.00c, Muntz metal 20.12c; Naval brass 20.37c.

Angles and Channels: Yellow brass 27.98c; commercial bronze 90% 29.57c, 95% 29.78c; red brass 80% 28.65c, 85% 28.86c.

Copper Wire: Bare, soft, f.o.b. Eastern mills, carlots 15.37½c, less-carlots 15.87½c; weatherproof, f.o.b. Eastern mills, carlots 17.00c, less-carlots 17.50c; magnet, delivered, carlots 17.50c, 15,000 lbs. or more 17.75c, less carlots 18.25c.

Aluminum Sheets and Circles: 2s and 3s, flat, mill finish, base 30,000 lbs. or more; del.; sheet widths as indicated; circle diameters 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.90c	32.90c
19-20	24"-42"	29.80c	35.30c
21-22	24"-42"	31.70c	37.20c
23-24	3"-24"	25.60c	29.20c

Lead Products: Prices to jobbers; full sheets 9.50c; cut sheets 9.75c; pipe 8.15c, New York; 8.50c Philadelphia, Baltimore, Rochester and Buffalo; 8.75c, Chicago, Cleveland, Worcester, Boston.

Zinc Products: Sheet f.o.b. mill, 13.15c; 36,000 lbs. and over deduct 7%, Ribbon and strip 12.25c, 3000-lb. lots deduct 1%, 6000 lbs. 2%, 9000 lbs. 3%, 18,000 lbs. 4%, carloads and over 7%. Boiler plate (not over 12") 3 tons and over 11.00c; 1-3 tons 12.00c; 500-2000 lbs. 12.50c; 100-500 lbs. 13.00c; under 100 lbs. 14.00c. Hull plate (over 12") add 1c to boiler plate prices.

Plating Materials

Chromic Acid: 99.75%, flake, del., carloads 16.25c; 5 tons and over 16.75c; 1-5 tons 17.25c; 400 lbs. to 1 ton 17.75c; under 400 lbs. 18.25c.

Copper Anodes: Base 2000-5000 lbs., del.; oval 17.62c; untrimmed 18.12c; electro-deposited 17.37c.

Copper Carbonate: 52-54% metallic cu; 250 lb. barrels 20.50c.

Copper Cyanide: 70-71% cu, 100-lb. kegs or bbls. 34.00c f.o.b. Niagara Falls.

Sodium Cyanide: 96%, 200-lb. drums 15.00c; 10,000-lb. lots 13.00c f.o.b. Niagara Falls.

Nickel Anodes: 500-2999 lb. lots; cast and rolled, carbonized 47.00c; rolled, depolarized 48.00c.

Nickel Chloride: 100-lb. kegs or 275-lb. bbls. 18.00c lb., del.

Tin Anodes: 1000 lbs. and over 58.50c, del.; 500-999 59.00c; 200-499 59.50c; 100-199 61.00c.

Tin Crystals: 400-lb. bbls. 39.00c f.o.b. Grasselli, N. J.; 100-lb. kegs 39.50c.

Sodium Stannate: 100 or 300-lb. drums 36.50c, del.; ton lots 33.50c.

Zinc Cyanide: 100-lb. kegs or bbls. 33.00c, f.o.b. Niagara Falls.

Scrap Metals

Brass Mill Allowances: Prices for less than 15,000 lbs. f.o.b. shipping point. Add ¾c for 15,000-40,000 lbs.; 1c for 40,000 lbs. or more.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	10.250	10.250	9.500
Tinned Copper	9.625	9.625	9.375
Yellow Brass	8.625	8.375	7.875
Commercial bronze			
90%	9.375	9.125	8.625
95%	9.500	9.250	8.750
Red Brass, 85%	9.125	8.875	8.375
Red Brass, 80%	9.125	8.875	8.375
Muntz metal	8.000	7.750	7.250
Nickel Sil., 5%	9.250	9.000	4.625
Phos. br., A. B. 5%	11.00	10.750	9.750
Herculoy, Everdur or equivalent	10.250	10.000	9.250
Naval brass	8.250	8.000	7.500
Mang. bronze	8.250	3.000	7.500

Other than Brass Mill Scrap: Prices apply on material not meeting brass mill specifications and are f.o.b. shipping point; add ¾c for shipment of 60,000 lbs. of one group and ½c for 20,000 lbs. of second group shipped in same car. Typical prices follow:

(Group 1) No. 1 heavy copper and wire, No. 1 tinned copper, copper borings 9.75c; No. 2 copper wire and mixed heavy copper, copper tuyeres 8.75c.

(Group 2) soft red brass and borings, aluminum bronze 9.00c; copper-nickel and borings 9.25c; car boxes, cocks and faucets 7.75c; bell metal 15.50c; babbitt-lined brass bushings 13.00c.

(Group 3) zincy bronze borings, Admiralty condenser tubes, brass pipe 8.00c; Muntz metal condenser tubes 7.50c; yellow brass 6.25c; manganese bronze (lead 0.00%-0.40%) 7.25c, (lead 0.41%-1.0%) 6.25c; manganese bronze borings (lead 0.00-0.40%) 6.50c, (lead 0.41-1.00%) 5.50c.

Aluminum Scrap: Prices f.o.b. point of shipment, respectively for lots of less than 1000 lbs.; 1000-20,000 lbs. and 20,000 lbs. or more; plant scrap only. Segregated 2s solids 10.00c, 11.00c, 11.50c; all other solids 9.50c, 10.50c, 11.00c; borings and turnings 7.50c, 8.50c, 9.00c; mixed solids 8.50c, 9.50c, 10.00c, mixed borings and turnings 6.50c, 7.50c, 8.00c.

Lead Scrap: Prices f.o.b. point of shipment. For soft and hard lead, including cable lead, deduct 0.55c from basing point prices for refined metal.

Zinc Scrap: New clippings, old zinc 7.25c f.o.b. point of shipment; add ½-cent for 10,000 lbs. or more. New die-cast scrap, radiator grilles 4.95c; add ½c 20,000 or more. Unsweated zinc dross, die cast slab 5.80c any quantity.

Nickel, Monel Scrap: Prices f.o.b. point of shipment; add ½c for 2000 lbs. or more of nickel or cupro-nickel shipped at one time and 20,000 lbs. or more of Monel. Converters (dealers) allowed 2c premium.

Nickel: 98% or more nickel and not over ½% copper 26.00c; 90-98% nickel, 26.00c per lb. nickel contained.

Cupro-nickel: 90% or more combined nickel and copper 26.00c per lb. contained nickel, plus 8.00c per lb. contained copper; less than 90% combined nickel and copper 26.00c for contained nickel only.

Monel: No. 1 castings, turnings 15.00c; new clippings 20.00c; soldered sheet 18.00c.

Sheets, Strip . . .

Sheet & Strip Prices, Page 122

With April rollings closed, some sheet producers are now scheduling well into May on CMP orders, despite the fact that a number of larger consumers have not yet obtained allotment numbers for delivery beyond April and in some cases not even for April. It appears the latter must rely on inventories or suffer loss of production.

Some observers find that smaller consumers have been more successful than larger users in obtaining CMP numbers for entire second quarter. This is believed to be due to complications in certifying their large diversity of orders. Many of them are subcontractors as well as primes and with products to buy in copper and aluminum as well as steel they have found progress difficult.

Warehouses are meeting difficulty in covering needs for products in the B classification, such as galvanized sheets, due to absence of regulations.

Continued heavy diversion of continuous mill capacity to plate production contributes to sheet shortage but an easing of this situation is expected by the end of second quarter as plate demand is believed about to level off.

Indications have appeared from Washington recently that restrictions on production of some durable consumer goods, such as refrigerators, washing machines and other lines, will be relaxed when steel production increases as new capacity comes into the picture. Production of guns, shells, tanks and other military products is said to be ahead of schedule and some relaxation may be expected if this is the case, freeing steel for other uses.

Producers of galvanized sheets who petitioned for an increase of $10 per ton to meet increased cost have received no response from Office of Price Administration. The plea is that the price of semifinished steel and zinc does not permit production of galvanized sheets, particularly in lighter gages, under present ceiling prices. Though experience differs galvanized sheets of 20 gage or lighter are sold at a loss. Small mills indicated in the program to concentrate galvanized production do not favor the plan unless prices are adjusted so they can at least break even on the entire range of gages. Manpower is another factor, many workers having been lost to smaller producers because of slack employment.

Non-integrated sheet mills are in worse position as to semifinished supply, especially in open-hearth grades. Bessemer sheet bars have been available in larger supply but their use has not been entirely satisfactory, depending on the type and amount of fabrication and the technique used by the fabricator.

An eastern Pennsylvania metalworker has placed 1300 tons of paint-grip galvanized sheets for bomb rack assemblies with a Midwestern mill.

Plates . . .

Plate Prices, Page 123

While plate orders are coming in more freely as the deadline for May rolling approaches producers believe tonnage will not be as heavy as at the prior month end as buyers seek to keep inventories down as much as possible in switching to CMP. Although most orders now being received are under CMP a considerable number are being sent in under PRP, which means filing of form No. 298. Consumers can continue to use these forms if they desire next month when they apply for June tonnage, but not after that time, as all rolling after June must be under CMP.

Meanwhile various orders are being filed with both a CMP allotment number and No. 298 forms, despite the fact the former is all that is necessary. Sellers ascribe this to confusion as to what is required, with consumers sending in both to be on the safe side. Sellers assert this makes extra work, not only for the buyers, but for themselves as they must check through the No. 298 forms for duplications.

Bars . . .

Bar Prices, Page 122

Most leading carbon bar sellers are now well booked into May on CMP orders which take preference over those with PRP ratings. Cold-drawn bar sellers are still further ahead, with nothing available now before June, as these processors had until the 25th of this month in which to get in their specifications for hot-rolled bars for May drawing. As a matter of fact, a substantial percentage of the tonnage drawn in that month will not be available for shipment until June; in the case of alloy cold-drawn

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bars, delivery schedules are at least 30 days behind that.

So far only the Navy appears to have done much about getting CMP ratings for third quarter. Little Army tonnage has been certified under CMP for that period, it is said, and small tonnage in other directions.

The percentage of CMP orders with relation to those with PRP ratings is increasing rapidly and a general effort is being made to get old orders certified under the new plan as rapidly as possible. So heavy have been CMP orders and the validation of old contracts under CMP that order departments of steel mills are having difficulty in keeping pace. Some mills do not know yet precisely where they stand with respect to shipments and as a result there have been delays in acknowledgment of orders which has caused buyers concern.

The supply situation on large diameter bars continues unchanged and fairly tight. Virtually all this tonnage is moving on directives. There has been a slight easing in supplies of large diameter bars shipped to warehouses. Smaller diameter material is in considerably better supply, with a much smaller proportion of material moving on directives.

Pipe . . .

Pipe Prices, Page 123

East Ohio Gas Co., Cleveland, has awarded 22,500 tons of 20-inch line pipe to Youngstown Sheet & Tube Co., Youngstown, O. This is for a natural gas line from Maumee, O., to a point near Cleveland, connecting with its lines from West Virginia and will convey gas originating in the Texas fields.

Wire . . .

Wire Prices, Page 123

Demand for wire products is heavy and CMP orders with allotment numbers are increasing. While some of this tonnage covers and is entered for full second quarter, production schedules are concentrated on tonnage for April delivery.

In fine wire specialties producers are confronted by production problems in meeting delivery on the approximately 30 per cent of the quarter's requirements wanted by numerous consumers in April. Much of the semifinished has to be ordered special, requiring six to eight weeks, and processing in the wire mill takes four to six weeks more. Thus it would appear mills will be hard put to ship part of the specialty tonnage before late second quarter.

Orders for bullet core steel are heavy; this material is annealed especially hard and in sizes up to one-half inch is stiff and difficult to draw. Large tonnage items also include rope wires of all types, signal wire, barrage cable and nails, demand for the latter holding. Rods are distributed by directives and numbered CMP orders are tightening the supply, notably in heavier sizes, with little tonnage available against straight ratings as high as AA-1.

Rails, Cars . . .

Track Material Prices, Page 123

Class I railroads on March 1 had 19,329 new freight cars on order, authorized by the War Production Board, compared with 70,602 on the same date last year. This included 8953 hoppers, 8428 gondolas, 1745 flats, 60 plain box cars and 143 miscellaneous cars. They also had on order 499 new locomotives, against 651 a year ago. Of these 352 were steam units and 147 electric and diesel. A year ago orders included 300 steam and 351 electric and diesel.

The roads put 2996 new cars in service in January and February, compared with 17,405 in the same period in 1942. Locomotives placed in service in these two months totaled 99, of which 83 were steam and 16 electric and diesel. In the same period last year 115 were put in service, 46 steam and 69 electric and diesel.

Structural Shapes . . .

Structural Shape Prices, Page 123

Fairly large volume of structural material is now being shipped from mills to warehouses. Probably the largest volume of structural moving against new business arises from small tonnage orders handled mainly through warehouses. Large jobs are practically nonexistent. Backlog of orders on structural mill books continues to decline, with the exception of special shapes for shipbuilding. Most structural fabricators are hopeful that the more liberal policy of the War Production Board will begin to show results soon in the form of a larger number of approved new structural jobs.

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They are watching particularly for an increase in highway construction work, inasmuch as this is one of the items for which more steel is being made available.

A case is cited as bearing on the more liberal use of steel in building, of an eastern architect recently advised by the government to redesign a war plant for greater use of steel, with the explanation that steel was not as scarce as wood.

Pig Iron . . .

Pig Iron Prices, Page 124

While sellers have not had time to analyze April pig iron allocations they report that for March there has been little pressure for iron, with some consumers requesting postponement of shipments to the end of the period and in a few cases asking delay of shipment to April.

All classes of melters are well satisfied with their supply, including most producers of non-war castings. Stove makers are operating at a relatively high rate, which is likely to continue through April.

Tin Plate . . .

Tin Plate Prices, Page 123

Large stocks of canned foods held by packers as a result of government freeze orders and the relatively slow movement of canned foods under point rationing are holding up normal shipments of cans which would be made at this time of year. As a result, tin plate producers are not receiving orders to cover the allotted volume of tin plate in so large a volume as they had anticipated.

Production is moving up, based on anticipated demand, as is normal at this time of year. Larger quotas for second quarter are having their effect on mill operations.

The export market for plate is still slow, considerably below the estimated annual production of export plate. This is regarded as normal by producers inasmuch as demand is tapering at this season in the southern hemisphere and it is expected last half will bring more than enough business to fill export quotas.

The electrolytic tin plate program is moving along slowly, with at least four units now producing and others on the verge of production.

Bolts, Nuts . . .

Bolt, Nut, Rivet Prices, Page 123

There is little change in backlogs held by bolt and nut producers. Order books are currently being converted from directives and priority ratings to the Controlled Materials Plan, with present tonnages about 50 per cent under CMP. Raw material stocks vary between 30 and 60 days on most items and bolt producers feel that the conversion to CMP will have little effect on their inventories of raw materials, particularly in the larger sizes.

Scrap . . .

Scrap Prices, Page 126

While scrap supply is being maintained and no shortages exist, improvement in collections do not keep pace with usual expansion at this season. This is attributed mainly to lack of workers in yards and to fewer collectors being in the field, other employment having tempted them away from their usual work. In a number of cases steelmakers are taking tonnage from their reserves, though not to an alarming extent. In general, supply is of better grade than formerly as industrial grades predominate.

Melters in the St. Louis district are receiving enough scrap to support current steel production, with little resort to reserves. Railroad scrap shipments have been heavier recently, mainly on allocations, high grade materials with considerable tonnage of rails. Country collections are slow, probably a result of seasonal farm activity.

Pittsburgh consumers find supply somewhat less than over the past few weeks. Material is being bought more actively and there are fewer rejections, particularly in the better grades. In the main, No. 1 heavy melting steel is in sufficient supply but there has been some shortage of low phos. Most current scrap is industrial, with relatively little from miscellaneous collections. Reports are conflicting as to the general situation, some observers predicting a definite shortage in the next few months and others that supply is adequate and that inferior grades are piling up.

Chicago consumers continue to dip into stocks as current receipts are not quite enough to balance steel production. An advance of approximately 15

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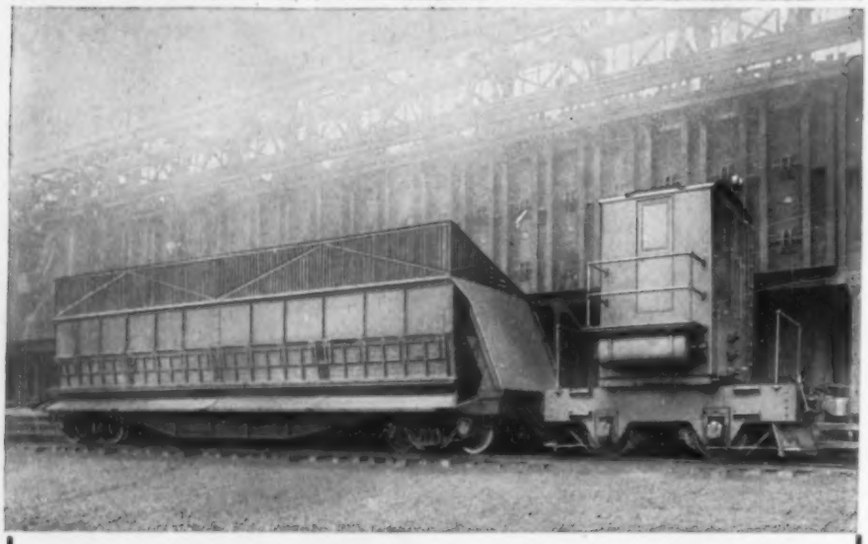

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per cent in wages for yard labor has been granted by WLB on petition of local scrap yards but it is doubted if this will suffice to hold workers against higher rates elsewhere. The increase is from 60 to 70 cents per hour for unskilled labor and from 70 to 85 cents for torchmen.

WPB estimates that only three of the 22 steel plants in the Chicago district have sufficient scrap inventories. The other 19 plants have less than the 30-day supply considered safe.

Foundries in the Cincinnati district no longer are seeking scrap as offerings are ample and that from remote sources, carrying high freight charges, is not acceptable. Some cast scrap is being refused by foundries. Boring and turnings are in oversupply, though they are being moved in most cases.

Better weather has increased deliveries to consumers in the Cleveland area, but receipts are less than consumption in some cases, stocks being drawn on. Heavy melting, cast and low phos grades are relatively scarce, with light material in large supply. Lack of yard workers limits processing. WPB Salvage Section reports that 42 counties in northern Ohio and western Pennsylvania, 250 scrap dealers involved, moved 120,500 tons in February, compared with 160,182 in January. In the same period automobile wreckers moved 7888 tons, against 6410 tons in January. They had on hand 8457 tons of loose scrap Feb. 28, against 9256 tons at the end of January. They bought 3925 cars in February, compared with 6137 in January.

Allocations of steelmaking scrap from the New York and New Jersey district are fewer and have been confined mainly to eastern Pennsylvania. For the moment allocations to midwest mills have halted. Scrap is not moving heavily to dealer yards but production of industrial grades is high, most moving direct. The alloy turnings situation is confused in the East, notably nickel turnings, and there is little market for these on an analysis basis. Some are going to blast furnaces and some are shipped as regular machine shop turnings but heavy production continues to pipe up supplies.

Ferroalloys . . .

Ferroalloy Prices, Page 124

Ohio Ferro-Alloys Corp., Canton, O., manufacturer of Simanal, alloy of silicon, manganese and aluminum, announces a reduction of ½-cent per pound, effective April 1. This makes the price in carlots 10c per pound; ton lots 10½c and less than ton lots 11c. The company also has placed on the market a new product, Borosil, an alloy containing 3 to 4 per cent boron and 40 to 45 per cent silicon. This is priced at $7 per pound, f.o.b. Philo, O.

Iron Ore . . .

Iron Ore Prices, Page 123

Consumption of Lake Superior iron ore in February was 7,103,914 gross tons in the United States and Canada, according to the Lake Superior Iron Ore Association, Cleveland. This compares with the record figures of 7,765,174 tons in January and with 6,403,362 tons in February, 1942. The gain over last year was due to eight more blast furnaces being in service, six in the United States and two in Canada. Idle furnaces in the United States as of March 1 were four, compared with ten a year ago.

Total ore stocks at furnaces and on Lake Erie docks March 1 were 32,743,294 tons, compared with 39,742,766 tons a month earlier and 27,525,822 tons March 1, 1942. Of the furnace stocks 26,702,-024 tons was held in the United States, compared with 22,986,559 tons a year ago.

As of March 1 active blast furnaces in the United States numbered 177, compared with 175 a month earlier and 171 a year earlier. Canadian stacks numbered nine, compared with seven a year ago.

Warehouse . . .

Warehouse Prices, Page 125

Steel warehouse procedure under CMP is expected to be clarified shortly by orders M-21-b-I covering general steel warehouse products and M-21-b-II covering merchant trade products.

These orders will prescribe procedures not included in existing warehouse orders and regulations, and will answer many questions about methods of obtaining stock replacements after April 1. It is likely that these will also be covered by additional CMP regulations which will supersede the M-21-b orders.

CMP regulation 4 establishes procedures to be followed by warehouses

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MARVEL SAWS

in making sales of controlled materials after April 1. Methods by which warehouses are to receive authorized tonnages of steel mill products during second quarter are established in CMPL-85.

Regulations for placing orders with steel producers during second quarter for third quarter delivery have not yet been issued. It is expected, however, that steel distributors may replace stocks to the extent of sales, even if sales exceeded former quotas.

Because of heavy demand for steel products for various war programs, most of which require mill shipments, the Requirements Committee of WPB has had to reduce the amount of steel which can be directed through warehouses during second quarter. In the case of carbon steel warehouses have been given purchase authorizations representing 83 per cent of first quarter, 1941, base period tonnage.

Quotas assigned to warehouses under supplementary order M-21-b expire March 31.

The CMP restriction limiting inventories among steel consumers to 60 days' forward requirements is expected to result in heavier demand on warehouses as supply gaps in manufacturers' stocks are becoming more numerous.

Expressed in terms of per cent of inventory to quota, the inventory position of steel warehouses from the December, 1941, quarter through final quarter of 1942 were 88, 84, 69, 59 and 74 per cent respectively. The trend continued upward during the first quarter this year.

Nonferrous Metals . . .

Nonferrous Prices, Page 127

Smelters and refiners of 13 nonferrous metals who now obtain their MRO supplies under the terms of order P-73 must henceforth submit their requirements in accordance with a revised procedure prescribed by WPB. They must now apply directly to the Mining Equipment Division for their requirements.

WPB will assign a serial number to each smelter and refiner who is entitled to receive priority assistance under provisions of P-73. Outstanding serial numbers will remain in effect until further notice. Serial-numbered producers must submit their requirements for MRO supplies on the new form PD-760 and must submit written applications for machinery and equipment. Material or equipment acquired under P-73 may not be disposed of by resale except to another smelter or refiner or with approval of the Mining Equipment Division.

WPB has authorized continuance of zinc dust allocations after March 31 under provisions of order M-11-L as amended. Allocations certificates will be issued as usual by WPB to consumers on or about April 1 for delivery during that month. Applications for allocations must still be made on PD-755 before fifteenth of the month preceding the calendar month in which delivery is wanted.

Steel in Europe . . .

London — (*By Radio*) — Bookings of steel for second quarter in Great Britain are extensive. The situation in heavy structural steel is easier. Expansion in production of alloy steels for armament continues as demand grows. Sheet demand is active. Rerollers are drawing on their reserves of semifinished steel to meet demands of their customers. The situation in heavy steel scrap has eased considerably.

Pacific Coast . . .

Seattle—Jobbing houses report a steady demand for all items. Deliveries of bars and shapes have improved and the situation is easier. Plates and sheets are scarce and wholesalers are unable to meet demands. Cold-finished steel continues tight and there appears no immediate prospect of larger supplies.

Fabricators state that the market is flat, no projects being up for figures. Tacoma has awarded 250 tons for radial gates and hoists for the Nisqually power project to the Worden-Allen Co., Milwaukee, and 150 tons for girders for three steel bridges for a Milwaukee railroad relocation job, to Pacific Car & Foundry Co., Seattle, Tacoma furnishing the materials. Also for the Nisqually project, Tacoma has received one bid for 100 tons or more of plates, penstocks and other equipment. Western Pipe & Steel Co.'s offer of $31,056, is pending.

Rolling mills are turning out occasional small lots of reinforcing bars. One plant has withdrawn from rolling reinforcing bars and its entire capacity is devoted to merchant bars, angles, flats and other items needed in large tonnages by shipyards. Merchant bar sales con-

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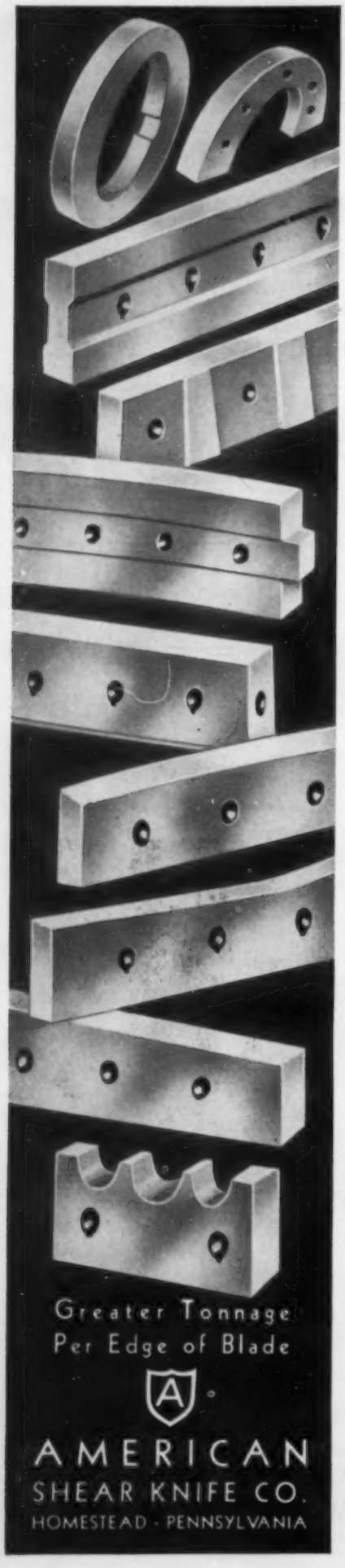

tinue steady and mills report large backlogs.

General Electric Co. is low to Tacoma at $9780, for furnishing carrier telephone equipment for the municipal light department.

Canada . . .

Toronto, Ont. — Canada's steel supply is now sufficient for all war needs, C. D. Howe, minister of munitions and supply, announced. This position has been reached only through drastic reductions in use of steel for essential civilian consumers, and by substantial increase in imports from the United States. Another factor is the forced curtailment in building activities which has released large tonnages. A decided shortage of steel materials is reported for civilian and nonessential use, but occasional allocations are being made for such purposes.

Mills' representatives state that orders covering a widely diversified list of steel materials are pouring into the market. While most of this covered lots of two to 15 or 20 tons a fair volume ranged from 100 to 500 or more tons. While a large part of the new business is in direct orders from the steel controller's department, orders for many of the smaller finished steel products are placed direct and deliveries are being made according to the buyer's priority rating, and in other instances when a surplus of some special material has been established by producers.

Sheet orders are mainly for small lots, but cover a fairly representative group of war buyers. Domestic production is not sufficient for all requirements and it is stated that large tonnages still are being imported from the States. Small releases are being made to essential civilian consumers.

More action developed in wire products during the past week or ten days, and some mills now report a fresh flow of orders from the farming areas for fencing. Wire and nails for war plant use in packing has been gaining in volume recently and mill representatives state that this consumption is well in excess of the tonnages lost through curtailment in construction work. Wire mills are maintaining irregular operations, depending on supply of wire rods.

Some easing in pig iron supply is reported but blast furnace operators have regained the position held at the first of the year regarding stock piles. Demand has shown some betterment from foundries that are out of scrap. Sales for the week were approximately 8000 tons of which about 4000 tons were foundry; 3000 tons malleable and 1000 tons basic iron. While melters are not placing quarterly contracts, they are making known their requirements to the steel controller, a month or two ahead of actual needs.

Repeal of Texas Tax on Iron Ore Being Sought

Repeal of the tax of 5 cents per ton on iron ore mined in Texas is asked by the Lone Star Steel Corp., which is building a blast furnace at Daingerfield, Tex., and hopes to obtain government funds for a steel plant. The company

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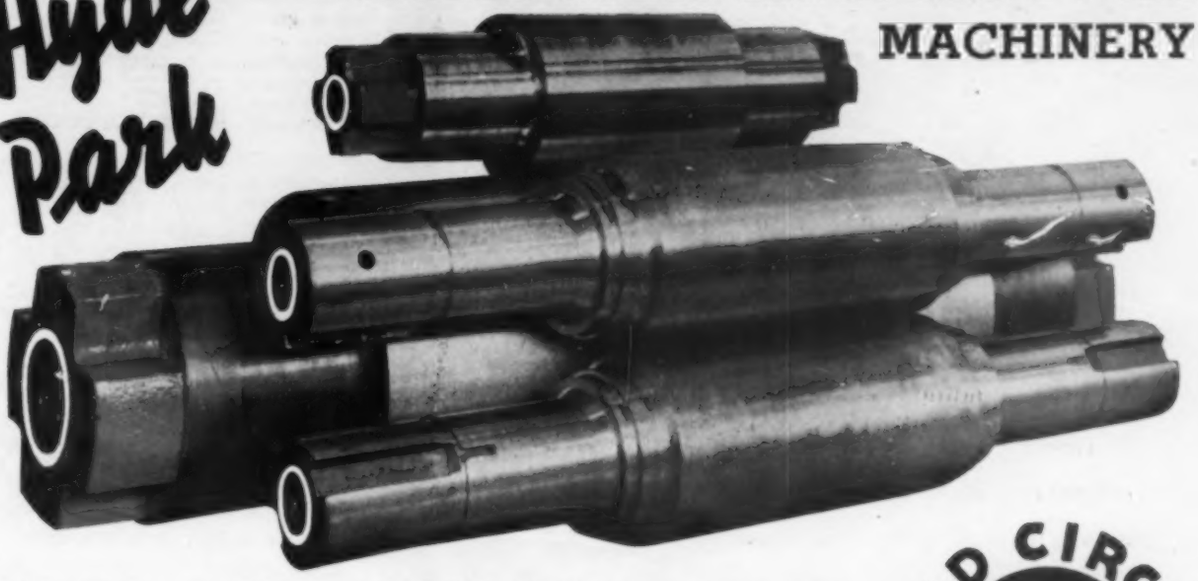

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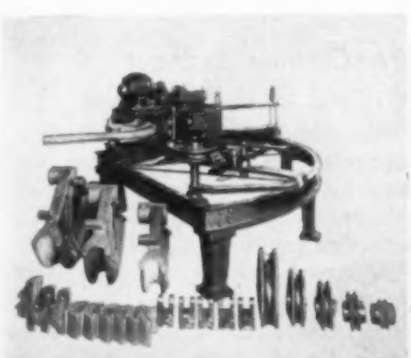

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claims the tax adds greatly to the cost of pig iron and makes it impossible to compete with furnaces in Alabama. A bill is before the legislature for repeal. It is argued that while the tax might be borne for wartime production it would be prohibitive in peacetime.

Reamer Prices Reduced

Wendt-Sonis Co., Hannibal, Mo., announces a 20 per cent reduction in prices of W-S standard reamers, effective April 1, applying to the company's entire line of straight and tapered shank carbide-tipped reamers from ¼ through 1½ inches. The reduction results from increased volume of production and acquisition of new facilities.

Resources Planning Board Assailed for "Loose Thinking"

Assailing the government for not stating its "specific war aims", Donald D. Conn, executive vice president of the Transportation Association of America, told the Great Lakes Regional Advisory Board meeting in Buffalo last week that "there is no better example of the loose thinking or of a bureaucracy attempting to balance its house in quicksands than the conception of postwar transportation recently presented to the American public by the National Resources Planning Board".

The planning board, he said, "recommends steps which would make government ownership inevitable."

The board estimated loadings in the Great Lakes region in the second quarter will be 535,031 cars, compared with 545,118 estimated for first quarter and actual 535,266 cars in second quarter, 1942. However, freight tonnage to be moved in the second quarter will be considerably greater than a year ago, due to the heavier loading of cars ordered by ODT.

New officers elected are: President, Frank J. Armstrong, Detroit; vice president, L. H. Baughman, Toledo; chairman of the executive committee, C. T. Stripp, Cleveland, and secretary-treasurer, B. C. Weaver, Detroit.

OPA Clarifies Ruling On Used Steel Tank Sales

Ruling issued by OPA to the effect that used steel tanks sold by any person who did not acquire them for purpose of resale are exempt from the general maximum price regulation is applicable only to such used tanks as are covered by that regulation.

J. N. Cole, acting chief counsel, Machinery Branch, WPB, says the ruling is not applicable to used steel tanks covered by regulations other than the GPMR.

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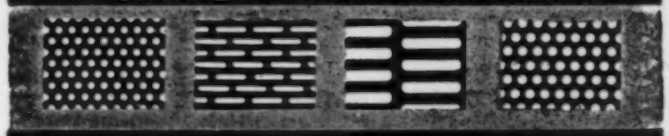

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Data on subcontract work are issued by regional offices of the War Production Board. Contact either the office issuing the data or your nearest field office. Write, don't telephone, and mention key letters and numbers appearing before each item to assure prompt attention and avoid delay.

New York office. Contract Distribution Branch of WPB, 122 East Forty-Second street, New York, reports the following subcontract opportunities:

S-11-21193: A Rochester, N. Y., prime contractor is seeking subcontracting facilities on a No. 6 B & S screw machine. Material, SAE 1112 steel. Quantity, 10,000 pieces to be machined. Materials and tools will be supplied by prime.

S-11-21212: New Jersey concern wishes to place subcontracting work immediately on booster fuses requiring threading machine facilities on turret lathes up to 2½ to 3-inch capacity Material, WD-1010 and 1020 steel. Quantity, 350,000. Material to be furnished by prime contractor.

S-11-21191: A New England manufacturer desires facilities for high-pressure die castings as well as the machining and plating of such castings. Quantities required are 3000 of each item. Material, Navy bronze. Tolerances, commercial. Threading facilities required.

S-11-21230: Screw machines. A New York concern is seeking subcontracting facilities to make 5,000,000 dowel pins per month. Machine needed, B & S No. 0 or similar. Spherical washers, 2,000,000 per month. Machine needed, ¾-inch automatic. Fuze magazine, roughing operations, no threads, 1,000,000 per month. Machines needed, one to four-spindle automatics. Booster bodies, roughing operations, no threads, Machine needed, 1¼-inch, four-spindle automatics.

S-11-15115: A Brooklyn manufacturer is seeking subcontracting facilities to manufacture gear blanks and other parts. Work consists of turning, boring and milling. Material is brass, bronze and steel. Machines required, turret lathes, engine lathes with turret attachments, horizontal millers and Bridgeport vertical millers for fly cutting purposes. Tolerances are close.

S-11-21150: New Jersey manufacturer is seeking subcontracting facilities to machine fuze parts of 1112 steel. Quantity, 30,000 per month. Size, 4.143 inches long by 2¼-inch diameter. Tolerance, plus or minus .005. Ten months run. Cases will be furnished. Machine required, 2⅝-inch six-spindle automatic screw machines. No. 2 fit on threads.

Minneapolis office, Contract Distribution Branch of WPB, 334 Midland Bank building, is seeking contractors for the following:

S. O. No. 373: Local prime contractor has work for a number of turret lathes, 1⅛ to 2 inches, or engine lathes with turret heads. Material is furnished, quantities are large and work starts at once. Drawings and specifications available.

S. O. No. 374: Parts, clamp nuts, bushings, etc. Twenty-seven small items in quantities of 1000 up, of each. Work is ideally suited to plants that have made perishable tools for ordnance. Calls for small turret lathes, hand screw machines and grinders. Material, cold-rolled steel, stainless steel and brass. Priority, AA-1. Tolerance, .001 to .005. Drawings at Minneapolis office.

S. O. No. 381: Part, coupling for plastic pipe, 3 x 3½ inches. Requires turret lathe, thread cutting. Material, welded or seamless steel tubing or gray or malleable castings. Deliveries, 7500 per month. Priority, AA-1. Drawings available.

S. O. No. 383: Job covers cups, machine parts, in two sizes, 500,000 of each. Deliveries 75,000 per month, starting April 1. Contractor will furnish free-machining stainless steel, ground to size and will also furnish all gages. Drawings are available.

S. O. 382: Part, nut. Quantity is 250.000, with deliveries of 50,000 per month. Material, free-machining stainless steel, is furnished. Requires machining, centerless grinding. Tolerance, .002. Drawings available.

S. O. No. 387: Marine anchor chain, each link about 8½ inches long, stock 1½-inch. Six lots, each of 210 fathoms. Forged from wrought iron. Priority AA-1. First lot delivered in 60 days, second in 90 days and others at 45 days intervals. Drawings and specifications supplied. Further opportunity later for similar requirements.

Philadelphia Office, Contract Distribution Branch, Production Division, WPB, Broad Street Station building, reports the following subcontract opportunities:

Bellert-11-1: A New England manufacturer requires additional facilities for supplying and machining three small parts. Malleable iron castings or steel, SAE 1010 to 1030. Continuous production, 2500 of each item per week, starting in May. Machine tools required, turret lathe 12-inch diameter 2½-inch bar or automatic multiple-spindle screw machine to ⅝-inch.

Buescher-11-1: A Delaware concern requires 26 sets of cylindrical forging die inserts (five dies to a set). Requirements: six sets, one set every ten days after receipt of order until May 1; twenty sets, one set every six days for a period of four months. Dimensions, 7 inches diameter x 17⅝ inches long. Die holes 3.757 to 5.429 inches. Material will be furnished, 17¾ x 7⅝-inch half round hardtem steel blocks. Brinell 3.40 to 3.55. Prints at Philadelphia office.

Buescher 11-2: A government agency requires facilities for manufacturing 20 tubular condensers, 1578 tubes, 2000 square feet cooling surface. Material will be supplied, shell and cast steel. Tubes are copper-nickel alloy ⅝-inch O.D. x .049-inch thick. Tolerance, No. 3 fit. Hot well to be tested to hydrostatic pressure 25 pounds per square inch. All welding to be in accordance with general specifications for machinery 51-4, class A3. Annealing for welding will not be required. Prints and specifications at Philadelphia office.

Buescher-10-1: A Pennsylvania manufacturer requires additional facilities for production of chain fittings. Various sizes, ranging from ¾-inch to 2¾ inches. Material will be furnished by prime contractor for at least a portion of the requirement. Dies to be supplied by subcontractor. Die blocks will be available for die sinker. Equipment required, 1000 to 8000-pound drop forge hammers. Prints, specifications and samples at Philadelphia office.

Chicago office, Contract Distribution Branch of WPB, 226 West Jackson Boulevard, is seeking contractors for the following:

AC Spark Plug Division, General Motors Corp., Flint, Mich., attention L. R. Steffen. Priority AA-1. Job covers machining of hex spark plug bodies. Either single or multiple-spindle automatic screw machines may be used. Total requirements, 2,500,000. May be divided among several contractors. Contractor supplies SAE 1112 steel.

Fairbanks Morse Co., Beloit, Wis., attention Sven Vaule. Priority AA-1. Immediate facilities needed for manufacture of 150,000 studs, ⅜ to 1¼-inch diameter, of various lengths. All threads must have Class 5 fits. Threads may be die cut, milled, rolled or ground as long as required fit is obtained. Repeat orders may be expected. Contractor supplies material.

West Bend Aluminum Co., West Bend, Wis., attention N. A. Schowalter. Priority AA-1. Parts, piston seat and piston. Quantities, lots of 2500, 5000 and 10,000. Subcontractor to do entire job and furnish material. Material, alloy steel. Equipment, 1-inch capacity single-spindle automatic screw machine, 1-inch bar capacity turret lathe, 10 x 24-inch universal cylinder grinder.

STRUCTURAL SHAPES . . .

SHAPE CONTRACTS PLACED

250 tons, radial gates, hoists and other equipment, Alder and LaGrande dams, second Nisqually project, Tacoma, Wash., to Worden-Allen Co., Milwaukee.

150 tons, girders for three steel bridges, railroad relocation, Tacoma Nisqually power project, to Pacific Car & Foundry Co., Seattle.

PLATES . . .

PLATE CONTRACTS PENDING

100 tons or more, steel penstock, manifold, elbows, etc., Tacoma Nisqually power project, Western Pipe & Steel Co., San Francisco, sole bidder, at $31,056.

PIPE . . .

CAST PIPE PENDING

100 tons or more, Eighth avenue South system improvement, Seattle; general contract to Matt Malaspina, Seattle.

STEEL PIPE PLACED

22,500 tons, 20-inch line pipe for East Ohio Gas Co., Cleveland, to Youngstown Sheet & Tube Co., Youngstown, O.

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LOCOMOTIVES PENDING

Pere Marquette, twelve 2-8-4 freight locomotives for 1944 delivery; bids asked.

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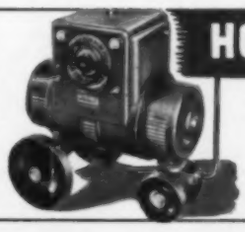

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MICHIGAN

DETROIT—Cooper Construction Co., 372 Maccabees building, has been awarded contract for addition to factory at 1940 Stanley avenue for Claude Sintz Inc.

DETROIT—Giffels & Vallet Inc., 1000 Marquette building, is preparing preliminary plans for addition to aircraft plant at River Rouge, Mich., for Ford Motor Co.

DETROIT—Boulevard Tool Co., 6150 Hamilton avenue, has been incorporated to deal in tools, dies, etc.; Henry J. Bock, 1184 Vernier road, Grosse Pointe Woods, Mich.

DETROIT—American Tool & Mfg. Co., 3502 West Fort street, has been incorporated with $100,000 capital to deal in tools, dies, etc.; Milton Strauss, 600 Pingree avenue, Detroit.

DETROIT—H. E. Beyster Corp., General Motors building, architect, has completed plans and is taking bids for power house to be located in Pontiac, Mich., for Die-Typing Corp., 3-135 General Motors building.

ROYAL OAK, MICH.—Hudson Tool & Machine Co., 126 East Hudson street, has given contract to Trowell Construction Co., 1334 Temple avenue, Detroit, for addition to its factory.

CONNECTICUT

BRIDGEPORT, CONN. — Briggs Mfg. Co., 11651 Mack avenue, Detroit, has let general contract for altering factory on Hollister avenue here to Harry Maring Jr. Inc., 536 Lindley street. Estimated cost $40,000, including equipment.

HARTFORD, CONN.—Whitney Chain & Mfg. Co., 237 Hamilton street, has let contract for one-story factory addition to Bartlett-Brainard Co., 103 Woodbine street. Cost estimated at $60,000. John T. Henderson, 750 Main street, engineer and architect.

NEW YORK

BUFFALO—Defense Plant Corp. has authorized increase in contract with Curtiss-Wright Corp., Buffalo, for additional plant facilities in Missouri; cost $825,000.

NEW JERSEY

MAHWAH, N. J.—American Brake Shoe & Foundry Co., Ramapo Valley road, has let contract for one and two-story foundry buildings to J. H. Steele & Son Inc., 48 North Second street, Paterson, N. J.

PATERSON, N. J.—American Seitzfilter Co., 204 Twenty-first avenue, has let contract for one-story manufacturing plant to Samworth Hughes Co., 177 Van Houten street. Cost $100,000.

OHIO

AKRON, O.—Akron Standard Mold Co., 1624 Englewood avenue, has completed plans for increasing facilities by altering present building and erecting additions.

CLEVELAND—Allied Plating Corp., John Hallack, president, 277 East 156th street, has awarded contract for one-story factory building to George Colcher, 369 East 200th street. Estimated cost $40,000. A. B. Loomis, 10016 Burton avenue, architect.

CLEVELAND—Ohio Electric Mfg. Co., C. Whittier, secretary-treasurer, 5901 Belford avenue, has awarded contract for factory additions, all one-story, to Sam W. Emerson Co., 1836 Euclid avenue. Ernest McGeorge and W. R. Hargett, 9300 Quincy avenue, engineers.

ILLINOIS

EAST ST. LOUIS, ILL.—Key Co., 2700 McCasland street, has plans by O. D. Conover, 1740 East Twelfth street, Cleveland, for foundry, pattern shop, service and office buildings. Estimated cost $1,000,000.

KENTUCKY

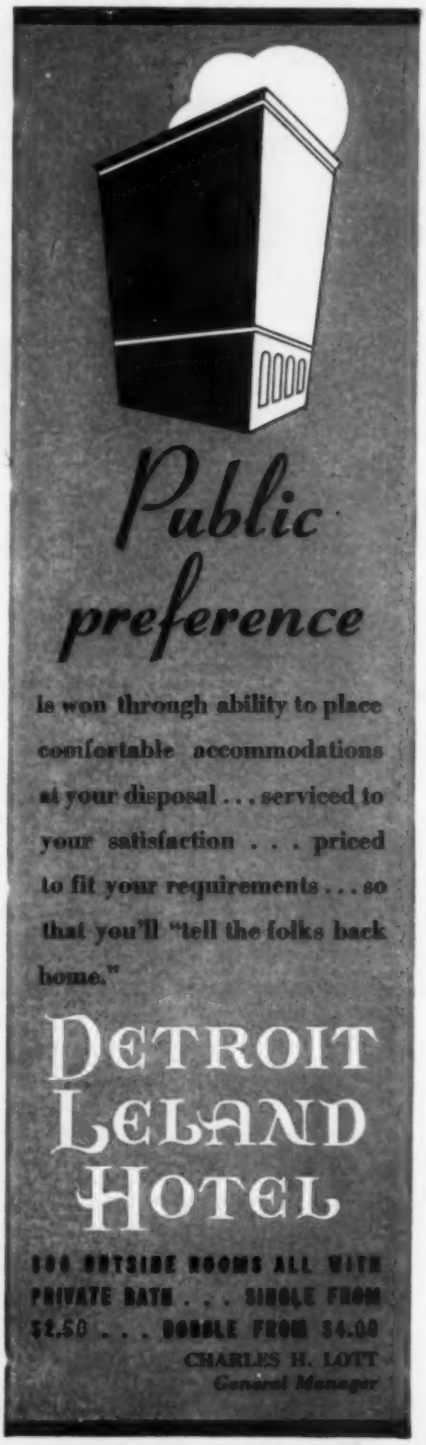
BARDSTOWN, KY.—Defense Plant Corp. has authorized increase in contract with Gary Shapiro, Bardstown, for equipment of plant; cost $15,000.

MARYLAND

BALTIMORE—Defense Plant Corp., Washington, has acquired factory site in Highlandtown area for manufacture of magnesium sand castings.

BALTIMORE—Standard Gas & Equipment Corp., Bayard and Hamburg streets, has given contract for one-story warehouse to Consolidated Engineering Corp., 20 East Franklin street. Estimated cost $40,000.

BALTIMORE—H. J. Dudley, 102 West Chase



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street, has been awarded contract for manufacturing building and two additions at 1301 Wicomico street for Defense Plant Corp. Revere Copper & Brass Co., lessee. Estimated cost $30,000.

MISSOURI

ST. LOUIS—Defense Plant Corp. has increased its contract with White-Rodgers Electric Co., St. Louis, to provide additional equipment for plant in Missouri; cost $150,000.

WISCONSIN

MILWAUKEE—Crucible Steel Casting Co., 2850 South Twentieth street, will build factory addition. R. W. Dwyer, 3617 West Washington boulevard, architect.

MILWAUKEE—Western Metal Specialty Co., 3043 North Thirtieth street, will build two-story factory addition. H. I. Messmer, 231 West Wisconsin avenue, architect.

UTAH

SALT LAKE CITY—Kalunite Inc., 600 West Thirty-third street South, Salt Lake City, has additional Defense Plant Corp. grant of $990,000 to provide more buildings and equipment at Kalunite processing plant now being erected.

CALIFORNIA

LOS ANGELES—Gay Engineering Corp. will erect factory at 2707 East Twelfth street. Estimated cost $21,416.

LOS ANGELES—Union Oil Co., 617 West Seventh street, will build gasoline absorption plant, Santa Maria Valley. Estimated cost $500,000.

SELBY, CALIF.—American Smelting & Refining Co. sustained damage to its plant by fire recently.

WASHINGTON

BELLINGHAM, WASH.—Multi-Products Engineering Co. has been incorporated with $40,000 capital by E. C. Olney & Associates, 411 Sunset building, to engage in machine shop business.

TACOMA, WASH.—Tacoma-Pacific Machine & Iron Works has been incorporated at $50,000 to manufacture machinery and appliances, by Ivar Dahl & Associates, 759 Port of Tacoma road.

CANADA

VANCOUVER, B.C.—Steelweld Ltd., 1571 Main street, has awarded contract for factory, costing approximately $25,000.

HAMILTON, ONT.—Frost Steel & Wire Co. Ltd., 250 Lottridge street, will start work soon on plant addition and installation of equipment to cost about $25,000.

KINGSTON, ONT.—Thomas G. Bishop Engineering Co., 382 King street East, D. L. Jackson, manager, will start work immediately on addition and repairs to plant, to cost about $20,000, with equipment.

LONDON, ONT.—Kelvinator of Canada Ltd., 1152 Dundas street East, C. W. Haden, general manager, will build plant addition to cost $10,000, equipment extra.

MALTON, ONT.—Victory Aircraft Ltd., in association with Department of Munitions and Supply, Ottawa, R. T. Donald, secretary, has extended general contract given to Milne & Nichols Ltd., 57 Bloor street West, Toronto, to include number of other plant units which will cost about $325,000, including equipment. Ewart, Armer & Byam, Excelsior Life building, Toronto, consulting engineers.

TORONTO, ONT.—Link Brass & Copper Co., 108 River street, has plans by B. Brown, architect, 21 Dundas square, and bids will be called soon for plant addition to cost $10,000, equipment extra.

TORONTO, ONT.—Howard Furnace Co. Ltd., 881 Yonge street, has given general contract to Finley McLachlan Ltd., 568 Oriole parkway, for plant addition, to cost $25,000, equipment extra.

WESTON, ONT.—Canada Cycle & Motor Co. Ltd., Dufferin street, has given general contract to Ramsay Contracting Co. Ltd., 39 Indian Road Crescent, Toronto, for plant addition costing $25,000, equipment extra. T. Pringle & Son Ltd., 501 Excelsior Life building, Toronto, engineer.

WINDSOR, ONT.—Defense Industries Ltd., head office C.I.L. House, Montreal, has given general contract to Allan Construction Co. Ltd., 44 Wyandotte street East, for plant here to cost about $500,000, including equipment.

MONTREAL, QUE.—Sicard Limitee, 2055 Bennett avenue, is considering plans for plant addition on Aird avenue, estimated to cost about $50,000, with equipment.

MONTREAL, QUE.—Canadian Pacific Railway Co., Windsor station, is having plans prepared by its own staff for alterations, additions and installation of equipment at Angus shops here to cost approximately $325,000.

MONTREAL, QUE.—Crane Ltd., 3800 St. Patrick street, is having plans prepared by T. Pringle & Son Ltd., 485 McGill avenue, for pipe plant and installation of two 5-ton cranes, six jib cranes, boiler plant, power substation and other equipment at total cost of about $375,000.

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Notice is hereby given that by virtue of an order of the Court of Common Pleas of Montgomery County, Ohio, made on the 6th day of March, 1943, I will offer for sale at public auction on the 14th day of April, 1943, at ten o'clock A.M. on the premises the following described real estate and other property of The Brookville Bridge Company:

Situate in the Village of Brookville, County of Montgomery, and State of Ohio, being Lots numbered Three Hundred Sixteen (316), Three Hundred Seventeen (317), Three Hundred Eighteen (318), and Three Hundred Nineteen (319), and Sixty One-hundredths (60/100) of an acre connecting the property with The P.C.C. & St. L. R. R. Also Lot Three Hundred Fifty-six (356).

At the same time there will be offered the following chattels:

2 riveters; 3 electric motors; 2 Rock River Mch. Co. Punch & Shear; welding machine; gasoline engine & generator; Ford truck, 1937 model; portable air compressor; emery stand and wheel; vise; small portable water pump; heavy timbers, trestles; angle irons; rivets; bolts; pulleys; line shafting; cable blocks; 1 ton pile driver; steam hoist; movable crane and hoist; misc. lumber; spikes; I Beams; 2 drawing tables; electric blue printing machine; 5 heavy air reamers; steel blue print cabinet; cross cut saws; corner air reamer; gages; aluminum paint; air hammers; air grinders; Herring-Hall-Marvin safe; safe cabinet; 2 adding machines; Remington typewriter; 2 roll-top desks; flat top desk; typewriter desk; office chairs; air hose; cement breaker, and other small tools too numerous to mention.

All chattels will be sold free of appraisement. Said property both real estate and chattels will be offered at sale separately and as a whole or in collective parcels within the discretion of the Receiver and will be sold in the manner that will bring the most money. Terms of sale: Cash.

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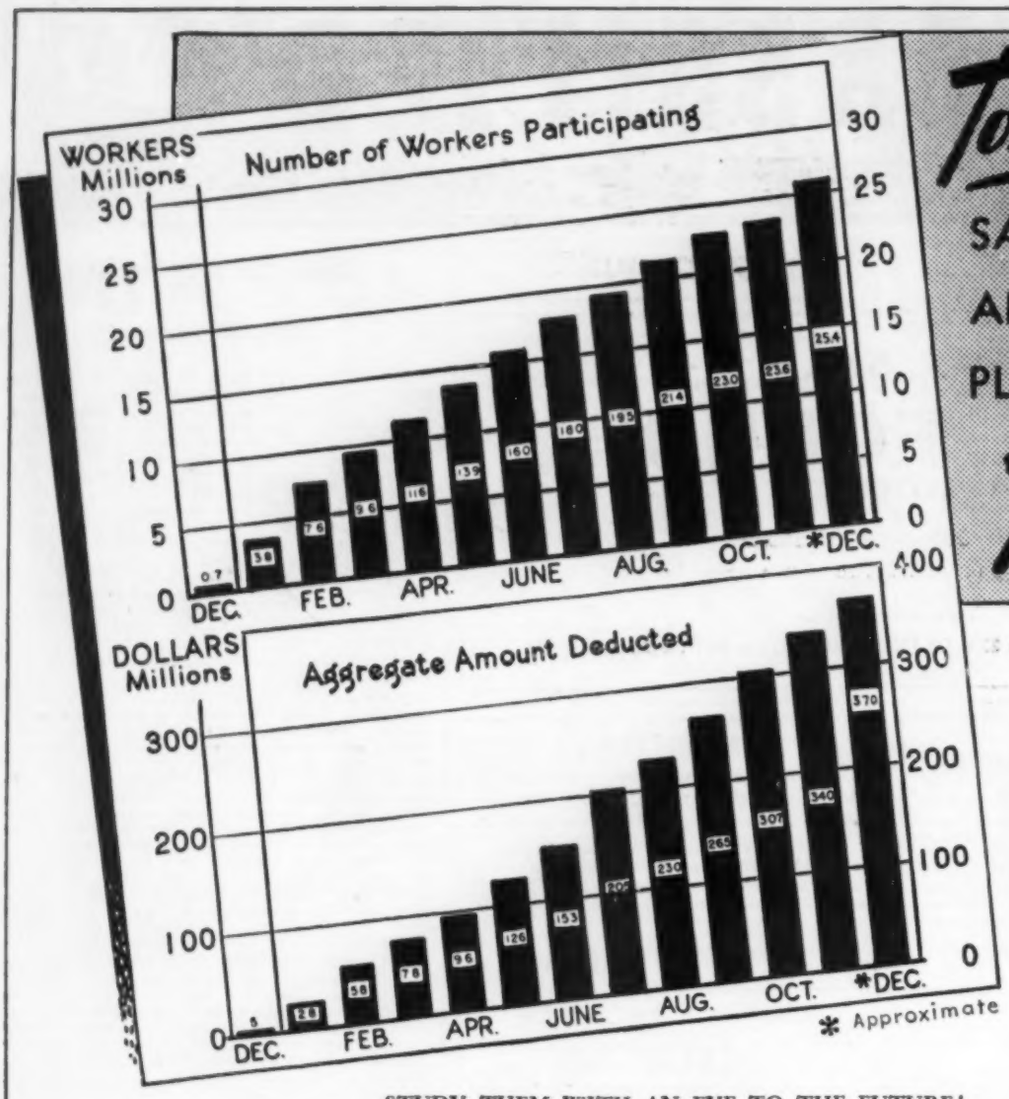

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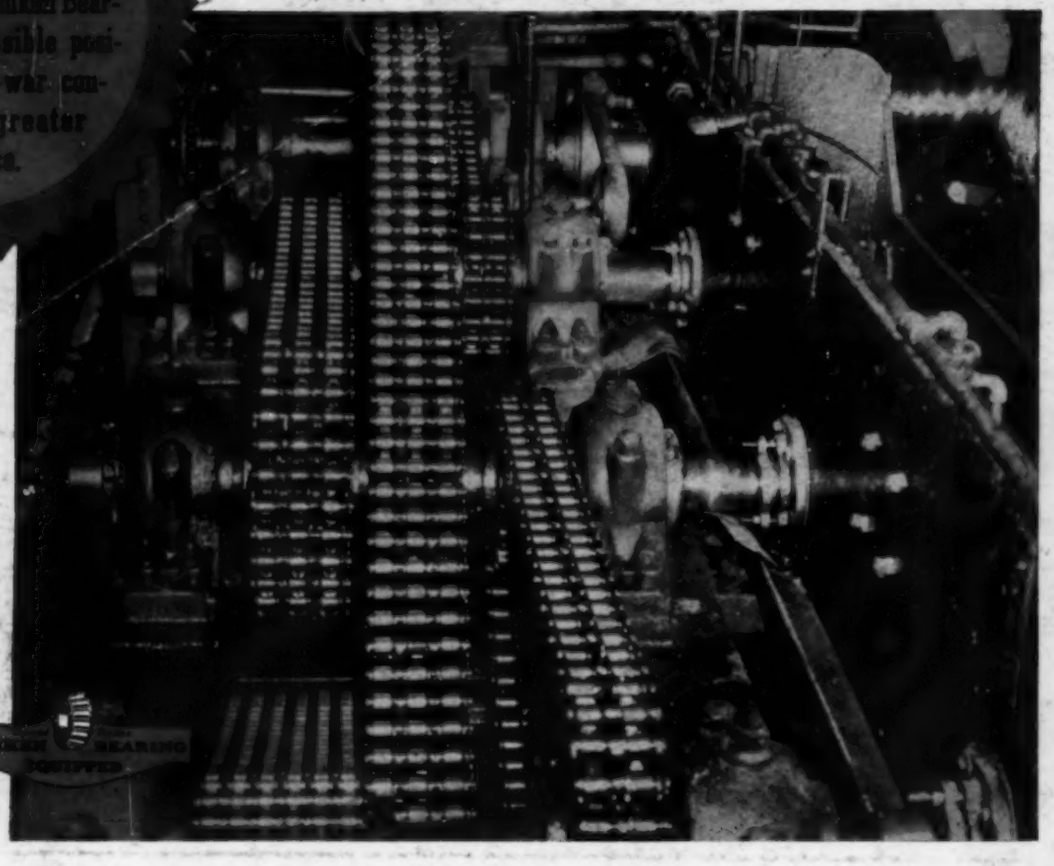

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